



**US Army Corps  
of Engineers**

**WILMINGTON DISTRICT  
SOUTH ATLANTIC DIVISION**

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**EVALUATION REPORT  
AND  
FINDING OF NO SIGNIFICANT IMPACT**

**MOREHEAD CITY HARBOR  
SECTION 933**

**CARTERET COUNTY, NORTH CAROLINA**

**August 2003**

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# SYLLABUS

The removal of 6,300,000 cubic yards of maintenance material from Brandt Island Upland Disposal Area as well as the maintenance dredging at Morehead City Harbor has created an opportunity for beneficial use of sand for the Carteret County beaches. The beach communities of Pine Knoll Shores, Indian Beach, and Salter Path are experiencing severe storm damage and erosion problems, particularly as a result of Hurricane Fran in September 1996 and Hurricane Floyd in September 1999. During the period from 1996 through 1999, Hurricanes Bertha, Bonnie, Dennis, and Irene have also affected the area. The storm damage and associated erosion from six named storms has resulted in considerable damage to homes and loss of the natural protective berm and dune system since 1996. The erosion of the berm and dune system has also increased and continues to increase the storm damage susceptibility of existing structures and infrastructure. The placement of sand from Brandt Island and Morehead City Harbor on these beaches would reduce the potential for erosion and storm damages.

This report presents two areas of beach placement to take place in conjunction with the Winter 2003/2004 Morehead City Harbor maintenance dredging and Brandt Island pumpout activities. The base disposal area is 100% fully funded by the Federal government and covers approximately 32,000 feet of Atlantic Beach and Fort Macon. If the Section 933 Project is implemented, the Base Disposal Plan will be modified from its 150-ft berm width to a 30-ft berm width; this is referred to as the Base Disposal Plan under the Section 933 project. This base disposal area under the Section 933 project will receive 1,834,000 cubic yards of sand. The area nourished with Federal/Sponsor cost sharing under the authority of Section 933 includes approximately 38,000 feet of shoreline along Pine Knoll Shores, Indian Beach, and Salter Path. The Section 933 project area will receive approximately 4,466,000 cubic yards of sand to construct a 30-ft berm width to an elevation of 7 feet above NGVD.

For the 38,000 feet of Pine Knoll Shores, Indian Beach, and Salter Path, where evaluation is required under Section 933, potential storm damage reduction benefits were analyzed. Expected annual hurricane and storm damages are reduced by 62 percent with the Section 933 project. Evaluating the Section 933 project over a twenty-year period of analysis, the total expected annual benefits (including incidental recreation) are estimated to be \$10,655,000, whereas the equivalent expected annual increase in cost for placement of material along the Section 933 project area is \$2,178,000. Thus, the net benefits would be \$8,477,000 and benefit-cost ratio for the Section 933 project area is 4.9.

Based on the findings in this report, Carteret County is eligible for 65% Federal and 35% non-Federal sponsor cost sharing for the added cost of depositing dredged navigation material on the beaches of Pine Knoll Shores, Indian Beach, and Salter Path, under authority of Section 933 of PL 99-662.

The added cost of placing this quantity of material on the beach rather than in the base disposal plan area is estimated to be \$16,354,000, of which \$10,630,000 would be paid by the Federal Government and \$5,724,000 contributed by non-Federal interest.



# EVALUATION REPORT AND FINDING OF NO SIGNIFICANT IMPACT

## MOREHEAD CITY HARBOR SECTION 933 CARTERET COUNTY, NORTH CAROLINA

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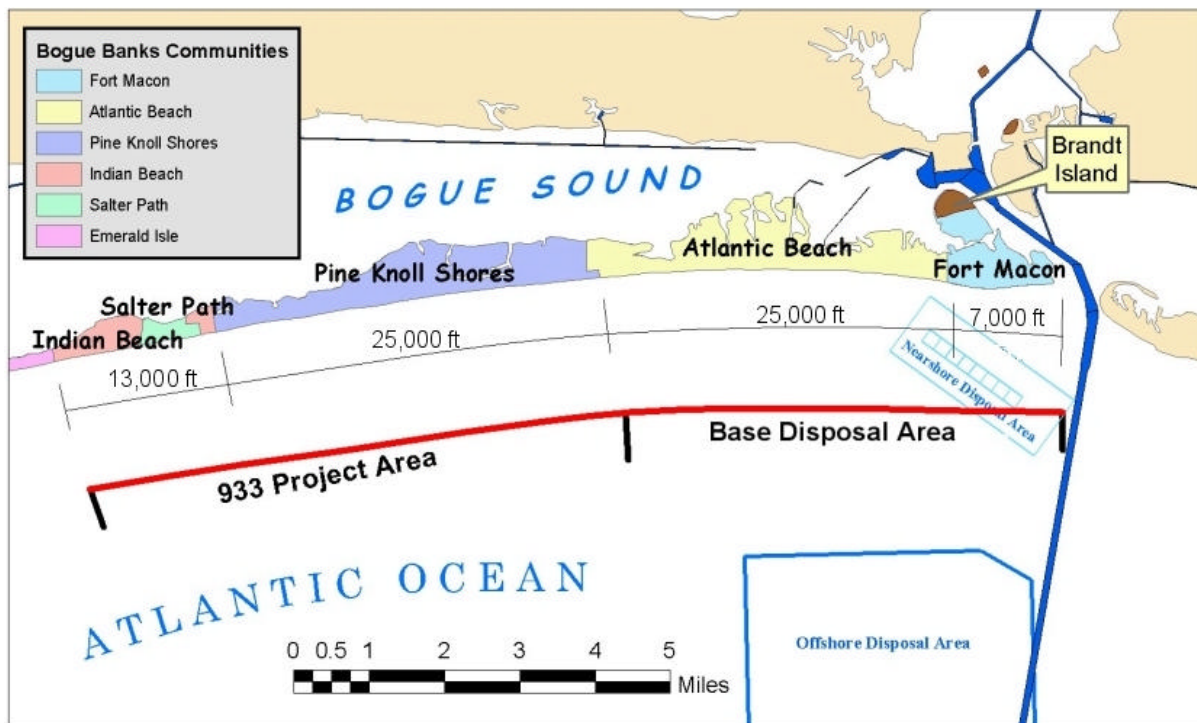
# **EVALUATION REPORT AND FINDING OF NO SIGNIFICANT IMPACT**

## **MOREHEAD CITY HARBOR SECTION 933 CARTERET COUNTY, NORTH CAROLINA**

### **SECTION I - INTRODUCTION**

The purpose of this study is to investigate the beneficial placement of dredged maintenance material from the authorized pump out of Brandt Island confined dike disposal area, and the maintenance dredging of the Morehead City Harbor navigation project, both of which are scheduled for the Winter of 2003-2004. This study analyzes the deposition of this dredged material along a portion of Bogue Banks beaches beyond the Corps' Base Disposal Plan, referred to as the "Section 933 Study Area" (Figure 1).

The Section 933 Study Area must be assessed for hurricane and storm damage reduction needs. This study also develops a plan of protection for this area based on the economic, engineering, and environmental feasibility, as well as the requests of the local sponsor.



**Figure 1. Morehead City Harbor Section 933 Study Area and Base Disposal Plan Area**

Carteret County beaches are located on the central North Carolina Coast (Figure 2). The section of beachfront requested to be investigated for the beneficial placement of dredged material for hurricane and storm damage reduction needs includes the resort communities of Pine Knoll Shores, Indian Beach, and Salter Path. This 7.2-mile-long shoreline reach is eroding due to hurricane and storm action. A minimal berm exists along most of the Study Area, resulting in the dune system being frequently inundated during moderate energy events. Numerous structures in this area are highly vulnerable to damage by storm action due to the eroded dune system and loss of natural protection.

Based on analyses conducted during this study, the beneficial placement of dredged material for hurricane and storm damage reduction along the 7.2 miles of Pine Knoll Shores, Indian Beach and Salter Path was determined to be economically justified using a uniform 30-ft berm design width. The sponsor had requested the distribution of the dredged material to be placed in a uniform 30-ft berm design width stretching from Fort Macon to the Indian Beach/Emerald Isle border. Only those areas beyond the Base Disposal Plan are required to be studied and justified as part of the Section 933 project.

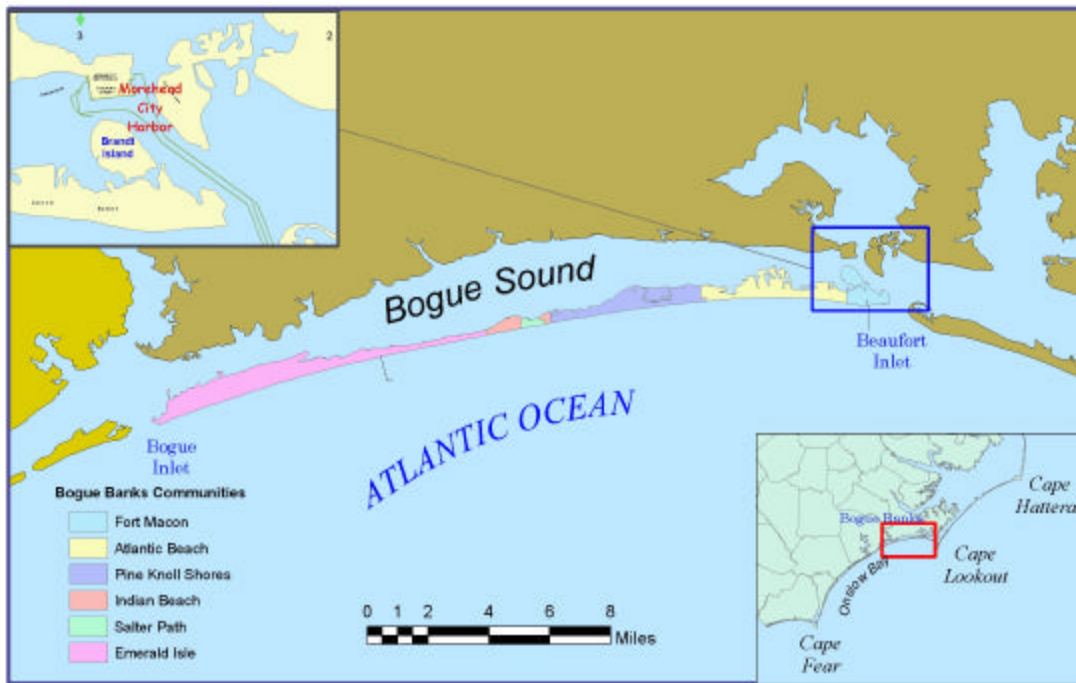


Figure 2. Morehead City Harbor Section 933 Location Map

## NON-FEDERAL SPONSOR

In a letter dated February 22, 2001, (see Appendix A, Exhibit 1) the State of North Carolina stated that they supported the interest of Carteret County in a study for a potential Section 933 Project for use of dredge maintenance material from the authorized pump out of the Brandt Island disposal area and dredging of Morehead City Harbor navigation channels, scheduled for 2003-2004, onto Bogue Banks beaches. This letter was produced on behalf of Carteret County that had passed a resolution on January 22, 2001 requesting a Section 933 Project to place this material onto the beaches of the Towns of Pine Knoll Shores and Indian Beach, and the Village of Salter Path (see Appendix A, Exhibit 2).

In their January 6, 2003, letter to the Wilmington District, Carteret County stated their commitment to acting as the cost-sharing sponsor for this Section 933 project (see Appendix A, Exhibit 3).

## **STUDY AUTHORITY**

This study was conducted under the authority of Section 145 of the Water Resources Development Act of 1976, P.L. 94-587, as amended by Section 933 of the Water Resources Development Act of 1986, P.L. 99-662, and other laws, 33 U.S.C. § 426j. Projects carried out under this authority are commonly referred to as “Section 933 projects.” The primary study emphasis was directed toward hurricane and storm damage reduction measures at Pine Knoll Shores, Indian Beach and Salter Path. The guidance for this study authority is:

### **ER1105-2-100, Section II, E-14(h), 22 April 2000:**

“Placement of Dredged Material on Beaches for Hurricane and Storm Damage Reduction. When placement of dredged material (beach quality sand) on a beach is the least costly acceptable means for disposal, then such placement is considered integral to the navigation project and cost shared accordingly. In cases where placement of dredged material on a beach is more costly than the least costly alternative, the Corps may participate in the additional placement costs when: (1) requested by the State; (2) the Secretary of the Army considers it in the public interest; and (3) the added cost of disposal is justified by hurricane and storm damage reduction benefits.

When all local cooperation requirements are met the Corps may cost share the additional 65 percent (Section 933, WRDA 1986, as amended). In cases where the additional costs for placement of the dredged material is not justified, the Corps may still perform the work if the State requests it, and the State or other sponsor contributes 100 percent of the added cost. If the State requests, the Corps may enter into an agreement with a political subdivision of the State to place the sand on its beaches, with the subdivision responsible for the additional costs. The Corps should consider and accommodate to the degree reasonable and practicable a State's or subdivision's schedule for providing its cost share. Each placement event should be supported by a separate decision document. Subsequent decision reports may be supplements to the original Section 933 decision document.”



## **SCOPE OF STUDY**

This report presents the results of studies conducted to address the needs for the placement of dredged material for hurricane and storm damage reduction for Carteret County beaches. The study area is shown on Figure 1. Study emphasis was placed on hurricane and storm damage reduction measures for the 7.2-mile-long Study Area as requested by the local sponsor. This area includes the communities of Pine Knoll Shores, Indian Beach and Salter Path. This report is submitted in compliance with Section 933 of WRDA 1986, as amended and Engineer Regulation 1105-2-100 quoted in the "Study Authority" section of this document.

The congressionally authorized Feasibility Study of Bogue Banks (Atlantic Beach, Pine Knoll Shores, Indian Beach, Salter Path and Emerald Isle) will investigate the long term shore protection needs for those beach communities and will be conducted as a separate study and reported later. Carteret County is the non-federal sponsor for this study.

## **PRIOR STUDIES**

There have been several prior studies in the study area and adjacent waters by the Wilmington District. These studies, listed below, include three shoreline studies, two navigation studies and a shoreline mitigation study.

House Document No.555, 87th Congress, "Fort Macon - Atlantic Beach and Vicinity, North Carolina," dated 1961. This report presents the results of an investigation of beach erosion along the Fort Macon - Atlantic Beach shoreline by the Wilmington District.

House Document No. 93-121, "National Shoreline Study," dated 1970. This report, approved by Congress in 1970, presents the results of an investigation of the nations' shorelines as part of a comprehensive study to address shoreline conditions including shoreline ownership, property values, and shoreline changes (eroding, stable, or accreting).

Wilmington District report, "Beaufort Inlet to Bogue Inlet, North Carolina," dated 1965. This report presents the results of an investigation of beach erosion along the Bogue Banks shoreline by the Wilmington District.

House Document No. 92-170/92/1, "Morehead City Harbor, North Carolina," dated 1970. This report presents the results of an investigation to deepen the project to 40-feet Mean Low Water (MLW).

Report of the Chief of Engineers, "Morehead City Harbor, North Carolina," dated 1991. This report presents the results of an investigation to deepen the project to 45-feet MLW.

Wilmington District Section 111 Feasibility Report, "Morehead City Harbor (Pine Knoll Shores), North Carolina," dated 2001. This report presents the results of an investigation of shoreline mitigation for the Morehead City Harbor Navigation Project.

## EXISTING FEDERAL PROJECTS

There are no active Federal hurricane and storm damage reduction projects in the study area. There is an active navigation project. The Morehead City Harbor navigation project presently consists of a 47-foot deep (MLW) by 450-foot wide ocean entrance channel through the ocean bar of Beaufort Inlet, which connects with channels and inner harbor which is generally 45 feet deep at MLW (East Leg) and 35 feet deep (West Leg and Northwest Leg). The current project is generally referred to as the 45-foot draft navigation project. A map of the Morehead City Harbor project is shown on Figure 3 and Figure 1 in the EA. Note that the entrance channel is composed of three reaches; namely, Range B (inner channel), the Cutoff, and Range A (ocean bar channel). The primary commodities passing through Morehead City Harbor are fertilizer products, rubber, and wood chips, which are handled by facilities provided by the North Carolina State Port Authority. Lesser amounts of petroleum products, machinery, and paper also pass through the State Port.

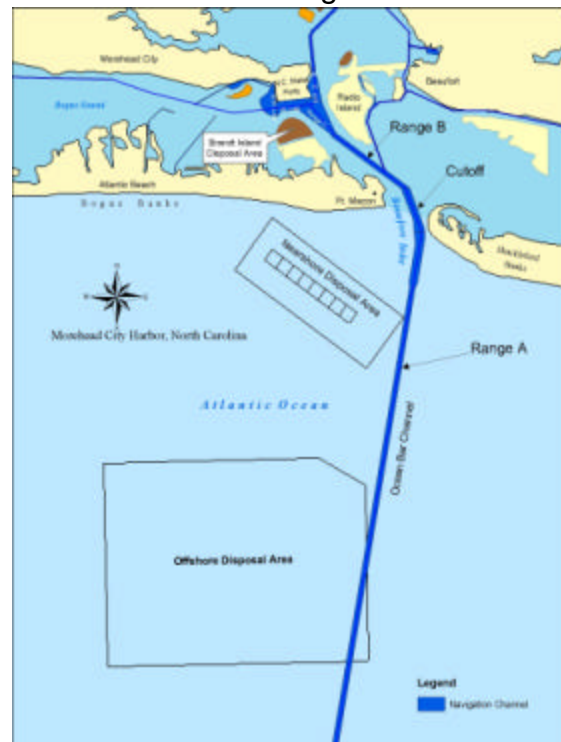


Figure 3. Morehead City Harbor

Historically, the Cutoff and Range A have been maintained by hopper dredge with the dredged material deposited in an offshore dredged material disposal site (ODMDS) located west of the seaward end of the bar channel. During the 1996 maintenance cycle for the bar channel, the disposal location was modified to include an option for near shore placement west of the bar channel in an area centered on the 30-foot MLW depth contour. Subsequent maintenance operations conducted in 1997 and 1999 required that all ocean bar channel material be placed in a near shore disposal site centered on the 25-foot MLW contour west of the channel.

However, operational constraints associated with the operation of hopper dredges has not allowed all of the maintenance material to be placed in the near shore site. The constraints associated with a hopper dredge operation include the inability of the dredge to deposit the material in shallow depths during unfavorable weather and wave conditions and the restricted dredging window

(i.e. the time period in which hopper dredges are allowed to operate) imposed on hopper dredge operations due to their propensity to interfere with sea turtles. The dredging window for hopper dredges extends from January through March.

Maintenance of Range B and inner harbor has been performed by pipeline dredge with disposal on Brandt Island, a confined dredged material disposal site located immediately across the harbor from the State Port facility. Due to the limited capacity of this site, and the absence of other suitable upland disposal site in the area, Brandt Island was identified as a temporary holding area for the inner harbor dredged material during the formulation of the 40-foot project in 1976 and the 45-foot project in 1994. In this capacity, maintenance material is to be temporarily stored on Brandt Island for a period of 8 to 10 years after which the material is transferred to a beach disposal site located along the eastern end of Bogue Banks. Previous beach disposal sites have covered sections of both Fort Macon State Park and the Town of Atlantic Beach. Transfer of material from Brandt Island to the beach was accomplished in 1986 and 1994.

## **FEDERAL STANDARD - BASE DISPOSAL PLAN**

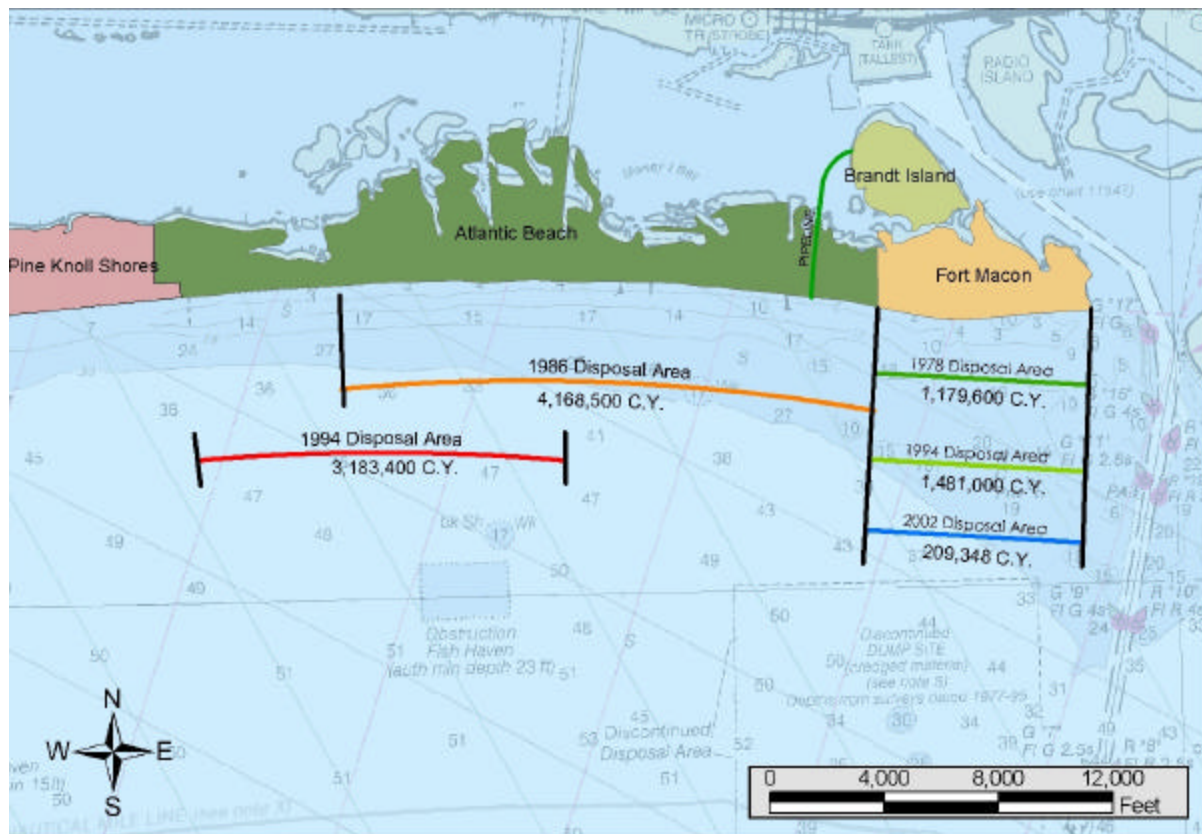
Should present plans for sharing sand by Bogue Banks beaches not materialize due to funding problems or other unforeseen reasons, up to 6.3 million cubic yards dredged maintenance material from the inner and outer harbor, as well as the pump out of Brandt Island would be distributed according to the base disposal plan as determined by the Federal Standard (see Appendix B). The base disposal plan represents the least cost alternative for the government, which is engineeringly feasible and environmentally acceptable.

Under the base disposal plan, the outer harbor would be maintained by hopper dredge and the resultant 1.5 million cubic yards of dredged material would be placed in the previously approved near-shore disposal area or the offshore dredged material disposal site (ODMDS) if inclement weather will not allow nearshore placement. The pumpout of Brandt Island and the maintenance dredging of the inner harbor by pipeline dredge would be placed using a design berm width of 150-feet. Up to 4.8 million cubic yards (about 4.0 million from Brandt Island and about 0.8 million from the inner harbor) of beach quality sand may be placed along approximately 32,000 feet of shoreline from Fort Macon State Park to the Atlantic Beach/Pine Knoll Shores border (Figure 1). If the North Carolina State Port Authority does not fund its share of approximately 1.2 million cubic yards of the Brandt Island material, this amount could be reduced to 3.6 million cubic yards.

## **HISTORICAL BEACH DISPOSAL OF MOREHEAD CITY HARBOR DREDGED MATERIALS**

Generally, routine maintenance dredging occurs every two years for Morehead City Inner Harbor and every year for the Outer Harbor. Pump outs of Brandt Island are scheduled every 8-10 years, depending on disposal capacity within the existing confined disposal area. Material removed from the Morehead

City Harbor project, from either Brandt Island or direct transfer onto beaches from maintenance activities, has been deposited on the shoreline of Bogue Banks on four separate occasions (Figure 4).



**Figure 4. Historic Beach Disposal Operations**

In 1978, a total of 1,179,600 CY of material removed for the deepening of the inner harbor and Range B was deposited along the Fort Macon State Park shoreline. In 1986, a total of 4,168,600 CY of dredged material was placed on Atlantic Beach between Corps of Engineers baseline stations 100+00 and 290+00. Of this total, 3,912,900 CY were from Brandt Island, and 255,700 CY of channel and basin maintenance material was transferred directly to the beach disposal site. In 1994 a total of 4,664,400 CY of material was placed on Fort Macon and Atlantic Beach with 3,183,400 CY being deposited between baseline stations 210+00 and 318+00 and the remaining 1,481,000 placed on the shoreline of Fort Macon State Park. Of the total 4,664,000 placed on the beach,

465,700 CY was maintenance material from the inner harbor, 1,725,000 CY was from new work construction, and 2,473,700 CY was from the Brandt Island disposal area. And finally, during the Spring of 2002, a direct transfer of 209,348 CY of maintenance material from the inner harbor was placed on the shoreline of Fort Macon between Corps of Engineers baseline stations 0+00 and 39+00 while the dike on Brandt Island was being reworked and was unavailable for accepting disposal material. The total amount of material available during any given pump out varies depending on the amount of material in Brandt Island and the annual maintenance needs of the inner harbor. There is no foreseeable new work dredging in the immediate future.

## **LOCALLY FUNDED RENOURISHMENT**

This project proposes to place approximately 4.57 million cubic yards of sand over 16.8 miles of Pine Knoll Shores, Indian Beach, Salter Path, and Emerald Isle shoreline. The source of the sand is an ocean borrow site. The project will be completed in three phases over a three-year period. The first phase has been completed with the nourishment of 6.8 miles of beach in Pine Knoll Shores and Indian Beach with approximately 1.7 million cubic yards of sand, which has been taken into account for the pre-Section 933 project conditions. The second phase is expected to place 1.8 million cubic yards of sand on 5.9 miles of Emerald Isle beginning January 13, 2003. And the final phase, if implemented would place 1.0 million cubic yards of sand on 3.5 miles of Emerald Isle in the winter of 2003/2004.

## **STUDY PARTICIPANTS AND COORDINATION**

This Section 933 study will be coordinated with various Federal, State, and local agencies and the public having concerns about the beneficial placement of dredged material for hurricane and storm damage reduction and the environmental impacts of proposed improvements. The Environmental Assessment (EA) was circulated for review and comment along with this Evaluation Report. Comments received during the public review of the EA are addressed in the Finding of No Significant Impact. Required coordination was conducted with all appropriate agencies.

## **SECTION 933 PROJECT REQUIREMENTS**

A Section 933 Project, as described under “ Study Authority”, allows for the placement of navigation maintenance dredged materials onto beaches other than those that are determined to be part of the Base Disposal Plan. However, a Section 933 Project is subject to the availability of adequate Federal funding as well as the following conditions being met (ER 1165-2-130, *Federal Participation in Shore Protection*, and ER 1105-2-100, *Planning Guidance Notebook*).

- a) The State must request that the dredged material be placed on the beach (this may be on the behalf of a political subdivision of the State);

- b) The added cost of placing the material on the Section 933 project beaches over the Base Disposal Plan must be justified by the benefits it produces;
- c) At least 50 percent of the additional costs must be covered by storm damage reduction benefits;
- d) The beach must be open to the public and provide reasonable public access that has been defined as access points approximately every **one-half mile or less**. In addition, sufficient public parking, located within a reasonable walking distance of the access points should be provided. Parking should be sufficient to accommodate the lesser of peak hour demand or the beach capacity for the project area.
- e) The placement of the dredged material must satisfy all applicable environmental statutes and regulations;
- f) The non-Federal sponsor must pay **35 percent** of the added cost of disposal above the cost of the Base Disposal Plan; and
- g) The non-Federal sponsor must provide, without cost to the Federal Government, all lands, easements, rights-of-way, and relocations needed to accomplish the work.

If all of these conditions are not met, the material could still be placed on the proposed beach areas outside of the Base Disposal Plan providing:

- a) The State requests that the dredged material be placed on the beach (this may be on behalf of a political subdivision of the State);
- b) Protection of the beach is in the public interest, regardless of benefits produced;
- c) The placement satisfies all applicable environmental statutes and regulations;
- d) The non-Federal-sponsor pays 100 percent of the added cost of disposal above the Base Disposal Plan; and
- e) The non-Federal-sponsor provides without cost to the Federal Government, all lands, easements, rights-of-way, and relocation.

## AREAS OF CONCERN

The following issues are considered areas of particular concern regarding the proposed project.

- In response to the January 15, 2002, scoping letter, the public and review agencies expressed the following major concerns: fishery resources and habitats, rare butterfly habitat, short- and long-term impacts of the proposed activity, endangered/threatened species, cultural resources, sediment contamination, and other natural resources.

## **PUBLIC BEACH ACCESS AND PARKING**

The Army Corps of Engineers has several requirements that must be met in order to fully cost share in a Section 933 project (see “Section 933 Project Requirements” section on the preceding pages). The Corps’ Wilmington District, additionally, has developed more specific public access and parking requirements for participation in Section 933 projects within the District’s boundaries of North Carolina (see Appendix E).

The Wilmington District, using aerial photography and traffic surveys from the July 4th holiday, conducted an analysis to determine the peak hour demand for the area. The data was used to determine that the communities currently have adequate parking to meet the Corps’ requirements for peak hour demand (see Appendix E).

The additional Section 933 requirements have been addressed by the local sponsor and documented in their Public Transportation and Parking/Access Plan for the proposed project area (see Appendix E – Exhibit 1). The document identifies the number of (8) and location of current public beach access sites and parking spaces (301) available, and outlines the sponsor’s plans for future public beach access sites and parking. Additionally, the document addresses the installation of a public transportation system to assist visitors in accessing areas of the beach that have public access, but no public parking.

The sponsor’s plan as currently proposed is acceptable to the Corps. Any changes to this plan or any new issues that arise will need to be resolved prior to the signing of the Project Cooperation Agreement.

When the plan is implemented, the sponsor will be eligible for full Federal cost sharing for the majority of the project area. The only exception currently identified includes the westernmost 1900 feet of Indian Beach (between Station 700+00 and Station 681+00) that does not meet the Corps’ criteria, and would require 100% non-Federal funding to nourish. The local Sponsor has indicated that they do not intend to pursue this option at this time.

The sponsor will be eligible for cost sharing of 65.0% Federal and 35.0% non-Federal sponsor for the Section 933 project. These values are based on the sponsor’s beach access and transportation plan and will be subject to change if more, less, or different access sites are decided upon prior to signing of the Project Cooperation Agreement. Once all access and/or parking sites are obtained, and prior to signing the PCA, the Corps will obtain specific measurements using GIS and or survey data of these sites to make a final determination on project cost sharing.

The local sponsor has developed the Public Transportation and Parking/Access Plan to identify how they will fulfill their commitment to meet the Corps’ Section 933 requirements. The adequacy of public access will be

revisited before the signing of a Project Cooperation Agreement. At that time, the Corps will verify that all plans have been implemented and that they meet all Section 933 requirements as outlined in this report.

If additional access points and parking are deemed necessary, the Wilmington District and local sponsor will work together on the local sponsor's plan to provide these. Should the local sponsor be required to obtain additional public access areas, these areas should be acquired as easements for the term of years identified in the Project Cooperation Agreement for which the local sponsor is responsible for providing public access for the project. The sponsor will be responsible for ensuring that the Section 933 requirements are met throughout the life of the project. Beach access and parking requirements are presented in Appendix E.



## **SECTION II - PROBLEM IDENTIFICATION**

The purpose of this report section is to identify problems, needs and opportunities in the study area in accordance with the study authority. This report section includes the following: (1) description of the study area; (2) an analysis of public concerns, which presents the concerns of local interests, Federal agencies, and others having interests in the study; (3) a statement of the National Objective, which outlines the criteria for Federal participation in water resources developments; (4) an assessment of Federal interest, which identifies concerns in the study area which the Federal government can address under this objective; and (5) specification of Problems, Needs, and Opportunities.

### **STUDY AREA**

Carteret County is located on the central North Carolina coast. Bogue Banks is a 25.4 miles long south-facing barrier island located on the low-energy limb of the Cape Lookout foreland within Carteret County. It is oriented in an approximate east to west direction between Beaufort and Bogue Inlets, located on the east and west terminuses of the island, respectively. The island is bound to the north by Bogue Sound, a relatively shallow water body through which the Atlantic Intracoastal Waterway passes (Figure 2).

Fort Macon State Park occupies the eastern end of the island. Political subdivisions on the rest of the island include, from east to west: the Town of Atlantic Beach, the Town of Pine Knoll Shores, an unincorporated area known as Salter Path, Town of Indian Beach, and the Town of Emerald Isle. The width of the upland portions of the island (the landmass above mean high water) varies from a minimum of approximately 800 feet to a maximum of over 4,000 feet. The narrowest part of the island, which ranges in width from 800 feet to 1,000 feet, is located along the easternmost 2.8 miles of Emerald Isle. The widest part of the island, which measures over 4,000 feet, is located on the westernmost 5.1 miles of the island, also within the corporate limits of Emerald Isle.

A maritime forest area is located on the sound side of Bogue Banks between the east portion of Indian Beach through Pine Knoll Shores. This reach of the island includes the Theodore Roosevelt Natural Area, which is the only portion of Bogue Banks included in the Coastal Barrier Resources System. In general, the island has been developed in such a manner as to preserve as much of the natural vegetation from the ocean to the sound as possible.

Hurricanes, extratropical events and progressive erosion have always occurred in the study area. Increasing development in Carteret County over the last several years has raised the potential for damages considerably. Development in the study area consists of single family houses, multi-unit apartment and condominium buildings, hotels, motels, and commercial buildings of various sorts, all covering a wide range of values and susceptibility to storm damages. Long-term erosion rates and elevations also vary over the study area.

Because of substantial variations in every factor that will affect storm damages, it is impossible to select any small areas or reaches that could be considered representative of the study area as a whole.

From 1990 to 2000, the population of Carteret County grew about 13% (i.e., 1990 population was 52,407 and 2000 population was 59,383). About 40 percent of the residents live in one of the county's municipalities. With its overwhelming economic emphasis on tourism, retail sales in Carteret County comprise the most important source of jobs and income for the county's economy. In 1993, total farm income for Carteret County was over 18 million dollars, with corn, soybeans, and tobacco the leading commodities. In 1995, the manufacturing sector employed about 10 percent of Carteret County workers.

The North Carolina Office of State Budget and Management estimates Carteret County's 1994 employment at 25,000, with about 35 percent in trade and 21 percent in Government employment. In 1997, per capita income in Carteret County was estimated at \$21,624, somewhat higher than the North Carolina per capita income of \$20,217.

The 1990's were a decade of rapid growth for the Carteret County beaches. The populations of the towns and Carteret County since 1990 are shown below. The total permanent population for the three principal towns in 2000 is estimated at 3,400. However, peak daily population in the summer can swell to more than 160,000 for the entire county.

**TABLE 1**  
**POPULATION STATISTICS**  
**CARTERET COUNTY, NORTH CAROLINA**

<u>Town/County</u>	<u>1990 Population</u>	<u>2000 Population</u>
Atlantic Beach	720	789
Pine Knoll Shores	1,360	1,524
Indian Beach	153	95
Morehead City	6,046	7,691
Carteret County	52,407	59,383

Carteret County population projections for 2000 – 2020 are shown below.

**TABLE 2**  
**POPULATION PROJECTIONS**  
**CARTERET COUNTY, NORTH CAROLINA**

<u>County</u>	<u>2005 Population</u>	<u>2010 Population</u>	<u>2020 Population</u>
Carteret	65,633	69,358	76,341

Source: Office of State Planning, State of North Carolina.

In the summer months, a large portion of the homes along Bogue Banks are available as summer rentals to vacationers. Almost 2 million people, including those residing in the Research Triangle area of North Carolina, live within a two-hour drive of these beaches. During the summer months, the population of Carteret County is estimated to exceed 160,000 people. In the off-season months, it drops to 59,000, which includes about 789 permanent residents in Atlantic Beach (2000), 1,524 in Pine Knoll Shores, 95 in Indian Beach and 7,691 in Morehead City.

## **PUBLIC CONCERNS**

Local interests have expressed a need for hurricane and storm damage reduction measures for the 7.2-mile-long shoreline reach, which includes the communities of Pine Knoll Shores, Indian Beach, and Salter Path. In addition, agencies and individuals with interests related to environmental quality have expressed concerns that any plan of improvement be implemented in a manner, which avoids or minimizes environmental impacts. Public concerns are summarized below; detailed discussion of these concerns will be presented in subsequent report sections.

### **HURRICANE AND STORM DAMAGE REDUCTION**

The concerns of local interests, as expressed by their elected representatives, are reflected in the Carteret County resolution and the State's request for a Section 933 evaluation, which is the basis for this study (see Appendix A, Exhibit 2). Hurricane and storm damage have been persistent public concerns in the communities of Pine Knoll Shores, Indian Beach and Salter Path. All three of these areas of Bogue Banks are faced with moderate erosion problems and there is a high potential for hurricane and storm damage to structures in these areas where the protective berm and dune system has been weakened or lost due to recent storm action and long term erosion.

## **ENVIRONMENTAL QUALITY CONCERNS**

In response to the January 15, 2002 scoping letter, the public and review agencies expressed the following major concerns: fishery resources and habitats, rare butterfly habitat, short-and long-term impacts of the proposed activity, endangered/threatened species, cultural resources, sediment contamination, and other natural resources. Specific concerns will be addressed in the Final Report.

## **CONSISTENCY WITH STATE COASTAL MANAGEMENT PROGRAM**

As will be discussed in subsequent report sections, the plan of improvement recommended is considered to be consistent with the State's Coastal Management Program.

## **THE FEDERAL OBJECTIVE**

The Federal Objective in water resources planning is to contribute to the National Economic Development in a manner consistent with protection of the nation's environment. If hurricane and storm damage reduction measures at Pine Knoll Shores, Indian Beach, and Salter Path are economically feasible (benefits exceed costs) and environmentally acceptable, construction of a Federal project for this purpose utilizing the beneficial use of dredged material from the Morehead City Harbor navigation project would contribute to this objective.

## **FEDERAL INTEREST**

In accord with the Federal Objective any plan of improvement to be recommended for Federal implementation must produce benefits that exceed costs. The area must also be open and accessible to the general public on an equal basis. Therefore, detailed studies were directed toward those areas within the 7.2-mile-long reach of shoreline that includes the communities of Pine Knoll Shores, Indian Beach and Salter Path, which will be referred to as the "Section 933 Project Area" (Figure 1). The technically feasible solutions identified in this study consisted of beach berm construction utilizing maintenance dredged material from the Morehead City Harbor navigation project to reduce hurricane and storm damage along the Section 933 project area. These measures will be discussed in detail in the subsequent report section on "Plan Formulation".

## PROBLEMS, NEEDS, AND OPPORTUNITIES

The primary public concerns identified in the study area are the loss of land and potential loss of structures due to progressive beach erosion and potential damages to structures due to hurricane and storm action. These concerns are discussed below, and protective solutions are identified. These solutions will be discussed in detail in subsequent report sections.

### LONG-TERM EROSION

"Long-term erosion" as used in this report section refers to long-term shore processes. These processes can be documented based on shoreline history, and projected to estimate future conditions. Erosion in this sense differs from erosion during storms, which, although devastating to development, is generally of a temporary nature. Following storms, the coastline tends to reshape itself into its former configuration, as sand displaced from the beach is returned by wave action. The beach shape then conforms to the prevailing wave climate and littoral processes.

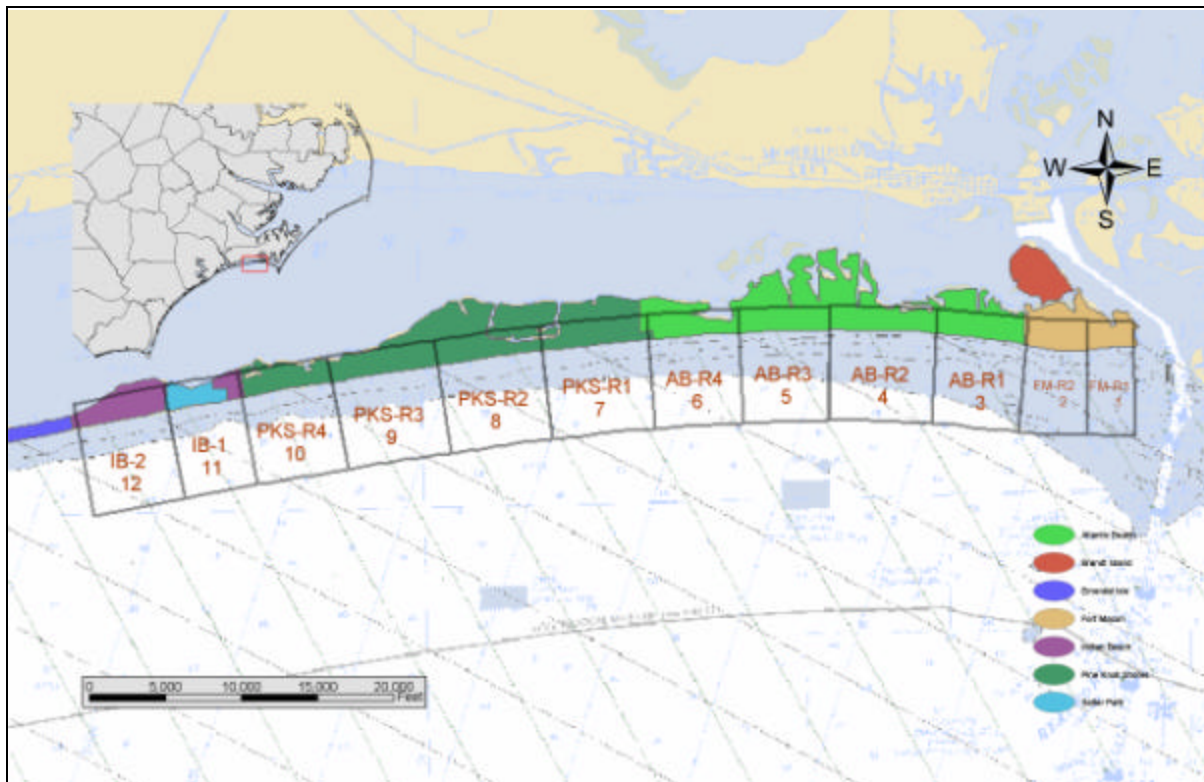
However, land losses due to progressive erosion are essentially permanent, as documented by the shoreline history along the Section 933 project area. Analyses of coastal processes conducted during this study indicate that historical erosion trends along the Section 933 project area can be expected to continue if no action is taken to stabilize erosion-prone areas. Past and projected future shoreline positions for the Section 933 project area are discussed below.

**Past Shoreline Positions, Section 933 Project Area.** Shoreline changes for beach segments from Fort Macon through Indian Beach are shown in Table 3. Figure 5 displays the "representative" reaches identified in Table 3. As shown, the peak erosion has occurred along the Pine Knoll Shores shorelines. Erosion has resulted in the loss of much of the protective berm and results in the dune system and structures located just upland of the shoreline being frequently threatened. Many of the seaward most buildings are highly vulnerable to damages by storm wave action due to the loss of the natural protective berm and dune system. Also, the width and quality of the beach available for recreation have diminished.

**Table 3**

**Shoreline Changes – Project Base Year 2004**

REPRESENTATIVE REACH	LENGTH (ft)	Erosion Rates Change (+ Accretion - Erosion)	Future Shoreline Positions Linear Distance (ft) (+ Accretion - Erosion)	
		RATE (ft/yr)	10-yrs 2014	20-yrs 2024
FM-R1	3020	-1.8	-18	-36
FM-R2	4016	-2.1	-21	-42
AB-R1	6063	-2.2	-22	-44
AB-R2	7053	-0.1	-1	-3
AB-R3	6019	+0.9	+9	+18
AB-R4	5998	-0.3	-3	-6
PKS-R1	7037	-2.0	-20	-40
PKS-R2	7008	-3.9	-39	-78
PKS-R3	7020	-3.6	-36	-72
PKS-R4	6006	-2.8	-28	-55
IB-R1	4994	-0.8	-8	-15
IB-R2	6011	+0.3	+3	+7



**Figure 5. Representative Reach Layout**

**Estimated Future Shoreline Conditions, Section 933 Project Area.** The discussion below presents an estimate of the future shoreline. Again, emphasis is placed on the 7.2-mile-long reach along the shorelines of Pine Knoll Shores, Indian Beach and Salter Path, which is the Section 933 Project Area. This estimated future without-project condition will form the basis for evaluating potential economic benefits for hurricane and storm damage reduction and developing dredged material placement plans to address these needs. For purposes of this discussion, it is assumed that no Federal project will be constructed before 2004. The year 2004 is referred to as the "base year" in subsequent report sections. (It should be noted that a Federal project could be implemented before or after 2004; however, this base year is assumed for purposes of economic analysis.)

Table 3 shows the estimated shoreline positions 10 and 20 years from the base year (2004). These projections were developed based on historic rates of erosion and shoreline adjustments, and do not take into account any erosion-control measures that might be undertaken during the periods of analysis.

By the year 2024, progressive long-term erosion is expected to threaten many structures along the Section 933 project area. The period of analysis for the Section 933 project has been selected to be 20 years. This is based on a 10-year physical life for the Section 933 project and doubling this time period for the period of analysis of the project.

The future shoreline positions discussed above are based on continuation of uniform historic rates of shoreline change. However, considering the value of property along the Section 933 project area (Pine Knoll Shores, Indian Beach, and Salter Path) relative to the cost of erosion control measures, it is likely that local interests will undertake temporary measures to protect against progressive erosion.

At present, the three towns bulldoze the beaches to create artificial dunes in the areas where erosion is most acute. Also, property owners have placed a small beachfill project along their property and have sandbagged for temporary protection. These projects have to be approved by the NC Division of Coastal Management. For beach communities that are actively pursuing a beach nourishment project, these local projects provide temporary protection until the long-term project is constructed. At the present level of activity, these measures are not sufficient to prevent erosion from proceeding landward, as shown in table 3. Therefore, unless more effective beach erosion control measures are undertaken, erosion is expected to progress landward.

Thus, the "most likely future" scenario along the Section 933 project area is that erosion control measures by local and state interests are not expected to provide significant protection against the erosion and flooding associated with hurricane and storm events.

## **HISTORICAL HURRICANE AND STORM DAMAGE**

"Hurricane and storm damages," as used in this report, refer to flooding by wave overwash during hurricanes and extratropical events, as well as short-term erosion, which occurs during these events. When the island is under hurricane and storm attack, the full force of the waves is felt along the immediate ocean shoreline; as the waves break and spill over the ocean edge of the island, development in upland areas is subject to the force of the waves. As noted in the discussion of "beach erosion" problems above, erosion is threatening much of the dune system along the shoreline within the Section 933 project area. These segments of the island could be overtopped by a category 2-storm event. With the smaller storms, such as a category 1-storm event, the principal damages would be associated with the battering and loosening of the pilings, which support beachfront structures, and the loss of decks and other structures. With the larger storms, such as Hurricane Donna in 1960, entire structures can be swept away. Past hurricanes and extratropical events and their damage potential are discussed below.

**Past Hurricanes and Extratropical events.** Devastating hurricanes and extratropical events periodically strike the study area. Storms occur in cycles with the recent years being fairly active. The following list is intended to present some of the worst storms that have been experienced in the study area. Hurricane season runs from 1 June through 30 November; while the northeaster season extends from 15 October to 10 April. Dollar estimates of the extent of the damages were not available for every storm and sometimes the available estimate covered a wider area than the scope of this study. Where any damage figures are given for storms in previous decades, it should be kept in mind that the damages would of course be far worse if a similar storm occurred today due to the surge in development during recent years.

During the years 1954 and 1955, three extremely severe and devastating storms struck the North Carolina coast. These hurricanes are important because similar storms do have the potential to occur in the study area. Hurricane Hazel, which pounded the coast from 5 to 18 October 1954, was the most destructive storm to strike North Carolina in 50 years. Every fishing pier along 170 miles of coast was destroyed. Between the North Carolina-South Carolina State line and Cape Fear, grass covered dunes, some 20 feet high, and a line of beach houses behind the dunes simply disappeared. Nineteen people were killed and 200 were injured. Damages throughout the State were estimated at \$125,309,000, of which \$31,190,300 occurred in the coastal and tidal areas. Hurricane Connie caused tremendous beach erosion between 3 and 14 August 1955. The damage throughout the State was thought to be about \$50,000,000, but before damages could be fully assessed, Hurricane Diane followed, and between 7 and 21 August, caused about \$40,000,000 more in damages.



## **Recent Hurricane History - Bertha, Fran, Bonnie, Dennis, Floyd, Irene**

**12 July 1996** - Hurricane Bertha. The center moved over the North Carolina coast near Wilmington on 12 July with sustained winds of approximately 105 mph and gusts reported as high as 144 mph at Topsail Beach. The category 2 hurricane was an early season Cape Verde Hurricane. Damages were estimated to exceed \$60 million for homes and structures and over \$10 million for agriculture. Corn, tobacco, and other crops received severe damage from the storm. Rainfall totals of over 5 inches were common in eastern North Carolina.

**6 September 1996** - Hurricane Fran. The center moved over the Cape Fear area around 0030 on 6 September and was moving northward near 15 knots. When it made landfall, Hurricane Fran was a category three hurricane resulting in significant storm surge flooding on the North Carolina coast and widespread wind damage over North Carolina. At landfall, the minimum central pressure was estimated at 954 mb and the maximum sustained surface winds were estimated at 100 knots. Twenty-one died in North Carolina alone. Rainfall totals exceeding six inches were common near the path of Fran. Extensive flooding spread well inland from the Carolinas. Storm surge on the North Carolina coast destroyed or seriously damaged numerous beachfront houses. Widespread wind damage to trees and roofs, as well as downed power lines, occurred as Fran moved inland over North Carolina. Extensive flooding was responsible for additional damage in the Carolinas. Nearly a half-million tourists and residents were ordered to evacuate the coast in North and South Carolina. Press reports from Reuters News Service stated that 4.5 million people in the Carolinas and Virginia were left without power. The Property Claim Services Division of the American Insurance Services Group reported that Fran caused an estimated \$1.6 billion dollars in insured property damage to the United States. This estimate includes \$1.275 billion in North Carolina, \$20 million in South Carolina, \$175 million in Virginia, \$50 million in Maryland, \$20 million in West Virginia, \$40 million in Pennsylvania and \$20 million in Ohio. A conservative ratio between total damage and insured property damage, compared to past landfalling hurricanes, is two to one. Therefore, the total U.S. damage estimate is \$3.2 billion.

**26 August 1998** - Hurricane Bonnie. The center drifted along the coast, with the western part of the eye moving across extreme southeast Brunswick County and over eastern New Hanover County. The center officially came onshore a short distance northeast of Wilmington during the late evening of the 26th and early morning of the 27th. Bonnie then moved slowly over extreme eastern North Carolina, emerging off the Outer Banks near Kitty Hawk early on the 28th. After being downgraded to a tropical storm while over land, Bonnie re-strengthened into a hurricane with 75-mph winds as it moved back into the Atlantic. Early estimates of storm tides are as follows. Brunswick coast: 7 to 9 feet above normal, 2 feet of overwash at Bald Head and eastern end of other islands. New Hanover and Pender County coasts: 9 to 10 feet above normal, 2 to 3 feet overwash at the north end of Carolina Beach. There was less overwash on the south end of Topsail Island.

**30 August 1999** - Hurricane Dennis. The hurricane lashed the Carolina coast on the 30th and part of the 31st with sustained tropical storm force winds, gusts to hurricane force, large waves, and high surf. The hurricane turned northeast away from the coast on the morning of the 30th and began to accelerate later that day while moving to the east-northeast. Dennis stalled about 150 miles east of Cape Hatteras on the morning of the 31st and then began to drift westward and weaken. During the first couple of days of September, Dennis continued to weaken and was downgraded to a tropical storm as it drifted slowly to the southwest along the lower Outer Banks. The storm turned to the northwest on the 4th and made landfall over the Outer Banks between Cape Lookout and Ocracoke as a tropical storm. NC 12 was washed out north of Buxton.

**16 September 1999** - Hurricane Floyd. The center made landfall near Cape Fear North Carolina as a category two hurricane around 0230 EDT September 16. The hurricane moved over the eastern part of the state and accelerated north-northeast up the coast, weakening to a tropical storm before moving into New England and losing its tropical characteristics early on the 17th. Floyd is responsible for massive inland flooding over portions of the eastern United States, particularly in North Carolina. The death toll from Floyd was 51 and makes this the deadliest United States tropical cyclone since Agnes of 1972. Many ocean front homes were heavily damaged.

**18 October 1999** - Hurricane Irene. The center passed just east of the Outer Banks early on the 18th. After passing the Outer Banks, Irene rapidly intensified and reached a peak intensity of 105 mph on the 18th. Irene continued northeast and was absorbed by an extra-tropical low on the 19th.

**Hurricane and Storm Damage Potential.** The Section 933 project area is heavily developed and the potential for hurricane-wave damage is more likely given the weakened dune system in this area. Unlike long-term erosion, which can be predicted, to some extent, based on past trends and observed shore processes, damages from hurricane-wave attack can occur in any year, and can be predicted only as a mathematical probability. Based on these probabilities, average annual damages were computed for hurricane and storm events, and will be discussed in Section III of this report, "Economic Benefits".

## **CONDITIONS IF NO FEDERAL ACTION IS TAKEN**

Development at Pine Knoll Shores, Indian Beach, and Salter Path is expected to continue, with or without any Federal projects. However, if no Federal action is taken this development will continue to be threatened by hurricanes and storm damage and long-term erosion. Basic assumptions are as follows:

(1) Most development is expected to still be in place by year 2004, the year in which it is assumed that a Section 933 project could be implemented along the Section 933 project area. Local interests are expected to take

short-term actions (bulldozing and sandbagging) to protect their property, however erosion will eventually threaten their structures.

(2) Local measures are not considered likely to provide significant protection against hurricane and storm damage, including wave overwash and flooding.

(3) The Corps of Engineers will continue to pursue the Federal Standard in navigation maintenance dredged material disposal for Morehead City Harbor, which is the most cost effective disposal plan that is environmentally acceptable and consistent with sound engineering practices.

## **SUMMARY OF PROBLEMS, NEEDS, AND OPPORTUNITIES**

The principal water-resources problems identified along the Section 933 project area are progressive beach erosion, due to long-term shore processes, and the threat of hurricane and storm overwash. The need for action to address these problems is particularly acute along the Section 933 project area including the resort communities of Pine Knoll Shores, Indian Beach, and Salter Path.

## **SECTION III - ECONOMIC BENEFITS**

The purpose of this analysis is to estimate the potential economic benefits that could be realized with the reduction of preventable damages due to beach erosion and hurricane and storm action in the Section 933 project area. As discussed previously, the Section 933 project area includes the 7.2-mile-long reach of shoreline, which includes the communities of Pine Knoll Shores, Indian Beach, and Salter Path. This is the area along Bogue Banks beaches where potential benefits are of significant magnitude to merit detailed study of a Section 933 project. Reduction of these damages, along with benefits for enhanced recreational use of the area, constitutes the economic justification for the plans of improvement that will be discussed in subsequent report sections.

## **METHODOLOGY AND ASSUMPTIONS**

The analysis of potential economic benefits, which follows is based on the assumption that no effective action will be taken to reduce hurricane and storm damages along the Section 933 project area. However, efforts by local and state interests will include bulldozing and sandbagging.

The interest rate for the analysis is 5-7/8 percent and a 20-year Period of analysis is used. October 2002 price levels are applied. The "base year" used for the economic analysis is 2004.

The structural database used for this analysis was compiled by field surveying every structure on the oceanfront and second-row in the Study Area, which includes the communities of Fort Macon, Atlantic Beach, Pine Knoll Shores, Indian Beach and Salter Path. Each structure was assigned a reasonable estimate of its depreciated replacement value. Factors such as age, condition, quality of materials, and type and quality of construction enter into this value determination. Tax values were used for the sake of comparison, since the Carteret County tax appraisers also strive to measure replacement value less depreciation.

Estimates of values of contents of commercial structures in the Study Area are based on interviews with business owners and insurance agents familiar with the Carteret County oceanfront, as well as empirical data collected for past studies. Each type of business has a unique content factor applied to its structural value. Motels comprise most of the commercial base and 50 percent of the structural value was used for their content value. For estimating the value of household contents of residential structures in the area, 40 percent of the structural value is used. This is based on site-specific responses from Carteret County officials, insurance agents, realtors, and homeowners familiar with the residential development along this section of oceanfront.

This analysis includes 842 structures that occupy the Study Area and Base Disposal Plan Area. Of this total, there are 470 structures in Atlantic Beach, 258 structures in Pine Knoll Shores, 69 structures in Indian Beach, 44 structures in Salter Path, and 1 structure in Fort Macon State Park. Altogether, they represent a total structural value of about \$377 million as shown in table 4.

**TABLE 4**  
**Structural Inventory by Town**

<b>Town</b>	<b>Number</b>	<b>Oceanfront Structure Value</b>	<b>Second Row Structure Value</b>	<b>Total Structure Value</b>
Fort Macon	1	\$160,000	\$0	\$160,000
Atlantic Beach	470	\$105,959,000	\$31,768,000	\$137,727,000
Pine Knoll Shores	258	\$119,791,000	\$27,688,000	\$147,479,000
Indian Beach (Salter Path)	113	\$77,258,000	\$14,039,000	\$91,297,000
<b>TOTAL</b>	<b>842</b>	<b>\$303,168,000</b>	<b>\$73,495,000</b>	<b>\$376,663,000</b>

## BENEFITS FOR HURRICANE AND STORM DAMAGE REDUCTION

Expected annual hurricane and storm damages for these areas were computed using Wilmington District computer programs (see Appendix D). The level of storm damage reduction for this beach fill configuration is determined by simulating hundreds of 20-year life cycles. This is accomplished through the use of the model, GRANDUC, which incorporates risk and uncertainty principles into the analysis. Through a random selection process, a particular 20-year simulation may include several severe storms or perhaps none. All of the 20-year life cycle simulations are run for the existing conditions, then again for a particular plan. Then, the average storm damage reduction potential afforded by a particular design configuration is computed. These damages are then estimated at an expected annual amount. Expected annual hurricane and storm damages for the Section 933 Project Study Area were estimated at \$14,543,000 as shown in table 5. The expected annual damage figure includes damages to structures and contents associated with inundation, wave impacts, and storm induced erosion.

TABLE 5  
Expected Annual Hurricane and Storm  
Benefits for the Section 933 Study Area

TOWN	Expected Annual H&S Damages			Expected Annual H&S Benefits 933 Plan
	Existing	BD Plan	933 Plan	
Pine Knoll Shores	\$12,008,057	\$12,008,057	\$4,750,681	\$7,257,376
Indian Beach	\$2,534,965	\$2,534,965	\$842,311	\$1,692,654
TOTAL	\$14,543,022	\$14,543,022	\$5,592,991	\$8,950,031

## **BENEFITS FOR EMERGENCY COSTS AND OTHER DAMAGE REDUCTION**

Emergency costs prevented refer to expected annual expenditures that residents and local and state governments are experiencing under the without project condition that a Federal project would preclude. Other damages prevented include storm damages that are not covered under the National Flood Insurance Program, but represent financial impacts on public and private storm victims that a Federal project could prevent. The categories for this benefit include: (1) bulldozing; (2) sandbagging; (3) emergency costs incurred by the North Carolina Department of Transportation (NCDOT); (4) damages to public property (water and electric utility distribution systems and access walkways); (5) damages to private property such as walkways, driveways, and cleanup costs; and post-storm recovery expenses and storm related expenses such as police patrolling, inspections, and permits. Expected annual emergency costs and other damages for the towns of Pine Knoll Shores, Indian Beach, and Salter Path are estimated at \$140,000. The Section 933 Project would reduce this amount to an estimated \$18,000. Therefore, the expected annual emergency costs reduction benefits for the Study Area amount to \$122,000.

## **BENEFITS FOR RECREATION**

As discussed previously, local interests are expected to bulldoze sand after storm events and place sandbags along the shoreline fronting their structures in an attempt to protect their structures for as long as possible. The local beach nourishment project has provided some additional relief to the beach area. However, the recreational beach that remains by 2004 is expected to be narrow at high tides. Potential recreation benefits for the Study Area were computed by estimating the unit day value of the recreational experience available with and without a Federal project. The term "unit day value" represents the economic value that is assigned to a day of recreational experience (see Appendix D).

A unit day value of \$3.96 was assigned for the "without project" condition (see Appendix D). The unit day value will be higher if a Section 933 project is implemented to restore and stabilize the beach strand. With the improved beach width and public access that would accompany a Section 933 project, a unit day value increase of \$5.32 for Pine Knoll Shores and \$5.11 for Indian Beach and Salter Path is considered more appropriate. This increase of \$1.36 for Pine Knoll Shores and \$1.15 for Indian Beach and Salter Path per unit day multiplied by estimated annual visitation represents the potential economic benefits for a restored and stabilized beach along the Study Area. Estimated visitation is discussed as follows.

Beach use along the Section 933 project area is estimated at a daily peak of 17,200 persons, based on data from the Towns of Pine Knoll Shores, Indian

Beach, and the Village of Salter Path and the Carteret County Tourist Bureau. This total represents an annual visitation of 776,000 for the Section 933 project area. Therefore, recreational benefits for the Section 933 project area are estimated at an expected annual amount of \$1,009,000 (555,000 visitor days x \$1.36 increase in unit day value for Pine Knoll Shores plus 221,000 visitor days X \$1.15 increase in unit day value for Indian Beach and Salter Path).

## **SUMMARY OF ECONOMIC BENEFITS**

The total expected annual benefits for shore protection along the 7.2-mile-long Section 933 project area that includes the resort towns of Pine Knoll Shores, Indian Beach, and Salter Path, are summarized in table 6. As shown, economic benefits include three categories: (1) Hurricane and Storm Damage Reduction Benefits - Potential benefits in this category are based on damages due to long-term beach erosion and short-term storm erosion and wave overwash during hurricanes and northeasters; (2) Emergency Costs and Other Damage Reduction - Potential benefits in this category are based on storm related expenditures that are not covered by the National Flood Insurance Program; (3) Recreation - Potential benefits in this category are based on increases in the value of the recreation experience for beachgoers with implementation of a Federal project within the Study Area; (4) Benefits During Construction – Those benefits that accrue to the project as it is being constructed.

**TABLE 6**

### **EXPECTED ANNUAL BENEFITS FOR THE SECTION 933 PROJECT AREA**

(Pine Knoll Shores, Indian Beach, and Salter Path)

<b>Benefit Category</b>	
Hurricane and Storm Damage Reduction	\$8,950,000
Emergency Costs and Other Damages Reduction	122,000
Recreation	1,009,000
Benefits During Construction	<u>574,000</u>
<b>TOTAL</b>	<b>\$10,655,000</b>

As shown in Table 6, total expected annual benefits for the Section 933 project area are estimated at \$10,655,000. In accord with the National Objective stated previously, the expected annual cost of any Federal improvement recommended must be less than the expected annual benefits. In addition, any plan of improvement to be recommended must be shown to be environmentally acceptable. Environmental resources in the Study Area are discussed in the following report sections.

## **SECTION IV - ENVIRONMENTAL CONSIDERATIONS IN PROJECT PLANNING**

The purposes of this report section are (1) to identify significant environmental resources which might be affected by a Section 933 project along the Section 933 project area; and (2) to identify criteria which should be followed in planning and designing a project to minimize impacts on those resources. Significant, or potentially significant, resources are discussed as follows.

### **SIGNIFICANT RESOURCES**

Generally, the upland areas in the Section 933 project area (i.e., Towns of Pine Knoll Shores and Indian Beach (including Salter Path)) have limited natural values, due to the intensity of development. However, the estuaries, inlets, beaches, and shallow ocean bottom surrounding the Section 933 project area has significant values, as discussed below.

### **BIOLOGICAL RESOURCES**

Marine waters in the vicinity of the beach disposal sites and maintenance dredging of the Morehead City Harbor outer navigation channels, provide habitat for a variety of ocean fish and are important commercial and recreational fishing grounds. Kingfish, spot, bluefish, weakfish, spotted sea trout, flounder, red drum, king mackerel, and Spanish mackerel are actively fished for from boats, the surf, and local piers. Off shore marine waters serve as habitat for the spawning of many estuarine dependent species. These species, according to the National Marine Fisheries Service, "compose approximately 75 percent of commercially and recreationally important catch of fish and invertebrates in North Carolina". The surf zone serves as a nursery area for Florida pompano and juvenile gulf kingfish during the summer. Nearshore waters also accumulate juvenile, ocean spawning, and estuarine dependent fish and invertebrates in the late winter and early spring prior to their transport through Beaufort Inlet and Bogue Inlet to the Bogue Sound estuary.

Although developed areas in the Study Area have limited habitat value, portions of the barrier island beaches (i.e., the inlet shorelines) within the Study Area are important nesting areas. During Migratory periods, piping plover, Wilson's plover, semipalmated plover (*Charadrius semipalmatus*), red knot (*Calidris canutus*), sandwich tern (*Sterna sandvicensis*) Foster's tern (*Sterna forsteri*), Royal tern (*Sterna maxima*), least tern, gull-billed tern (*Sterna nilotica*), common tern, black tern (*Chlidonias niger*), Caspian tern (*Sterna caspia*), herons, egrets, marbled godwit (*Limosa fedoa*), laughing gull (*Larus atricilla*) and cormorant are commonly found in and around the inlets. Overwintering bird species include piping plover, brown pelican, cormorants, Foster's tern, Royal tern, dunlin, and various gull species. Potential project areas were surveyed



during this study to determine potential use of these areas by the species mentioned above and the results are presented in the attached Finding of No Significant Impact (FONSI).

A natural dune system is present along the Study Area, however, this dune system is being severely eroded. These dunes are vegetated primarily with grasses, sea oats, and salt meadow hay, which provide habitat for some wildlife species including birds and small mammals. Dunes serve an important function as a barrier to storm tides, protecting barrier island development. Dune vegetation such as sea oats is important as a dune builder and helps to protect against erosion. It is expected that the recommended plan will result in reestablishing and protecting the dune system along the project area.

More detailed descriptions of the landforms and fish and wildlife resources of the study area are presented in the attached FONSI.

## ENDANGERED AND THREATENED SPECIES

Coordination with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service has been conducted to identify endangered and threatened species (as well as Federal Species of Concern) that might be present in the vicinity of the Study Area. Species that are currently Federally listed as endangered or threatened (as well as Federal Species of Concern), which may or do occur in the Study Area, and which may be subject to impacts from beach disposal are listed in Table 7.

TABLE 7

### THREATENED AND ENDANGERED SPECIES (INCLUDING FEDERAL SPECIES OF CONCERN) POTENTIALLY PRESENT IN CARTERET COUNTY, NORTH CAROLINA

<u>Species Common Names</u>	<u>Scientific Name</u>	<u>Federal Status</u>
<i>Vertebrates</i>		
American alligator	<i>Alligator mississippiensis</i>	T(S/A)
Eastern cougar	<i>Felis concolor couguar</i>	Endangered*
Green sea turtle	<i>Chelonia mydas</i>	Threatened 1
Hawksbill turtle	<i>Eretmochelys imbricata</i>	Endangered
Right whale	<i>Eubaleana glacialis</i>	Endangered
Sei whale	<i>Balaenoptera borealis</i>	Endangered
Sperm whale	<i>Physeter macrocephalus</i>	Endangered
Finback whale	<i>Balaenoptera physalus</i>	Endangered
Humpback whale	<i>Megaptera novaeangliae</i>	Endangered
Kemp's ridley sea turtle	<i>Lepidochelys kempii</i>	Endangered
Leatherback sea turtle	<i>Dermochelys coriacea</i>	Endangered
Loggerhead sea turtle	<i>Caretta caretta</i>	Threatened
West Indian Manatee	<i>Trichechus manatus</i>	Endangered

Piping Plover	<i>Charadrius melodus</i>	Threatened
Roseate tern	<i>Sterna dougallii</i>	Endangered
Shortnose sturgeon	<i>Acipenser brevirostrum</i>	Endangered
Smalltooth sawfish	<i>Pristis pectinata</i>	Endangered

#### *Invertebrates*

a skipper (butterfly)	<i>Atrytonopsis sp1</i>	FSC
Arogos skipper	<i>Atrytone arogos</i>	FSC

<b><u>Species Common Names</u></b>	<b><u>Scientific Name</u></b>	<b><u>Federal Status</u></b>
<i>Vascular Plants</i>		
Rough-leaved loosestrife	<i>Lysimachia asperulaefolia</i>	Endangered
Seabeach amaranth	<i>Amaranthus pumilus</i>	Threatened

<sup>1</sup>Green turtles are listed as threatened, except for breeding populations in Florida and on the Pacific Coast of Mexico, which are listed as endangered.

#### **KEY:**

##### Status

##### Definition

Endangered - A taxon "in danger of extinction throughout all or a significant portion of its range."

Threatened - A taxon "likely to become endangered within the foreseeable future throughout all or a significant portion of its range."

T(S/A) - Threatened due to similarity of appearance (e.g., American alligator)--a species that is threatened due to similarity of appearance with other rare species and is listed for its protection. These species are not biologically endangered or threatened and are not subject to Section 7 consultation.

FSC - A Federal species of concern--a species that may or may not be listed in the future (formerly C2 candidate species or species under consideration for listing for which there is insufficient information to support listing).

Species with 1 asterisk behind them indicate historic record:

- \* Historic record - the species was last observed in the county more than 50 years ago.

Potential project-related impacts have been addressed for each of these species and are presented in the attached FONSI. It has been determined that the project, as currently proposed, may affect the, piping plover, green sea turtle, hawksbill sea turtle, Kemp's ridley sea turtle, leatherback sea turtle, loggerhead sea turtle, shortnose sturgeon, and sea-beach amaranth. Methods to minimize impacts to these species are found in the attached EA.

## **WATER QUALITY**

Morehead City Harbor is located at the confluence of the Newport River and Bogue Sound. All tidal waters within Morehead City Harbor are classified as SC

and SA. Coastal waters offshore of the project area are classified SB by the State of North Carolina (NCDEM 1989). Class SA waters are defined as suitable

for shellfishing for market purposes and any other usage specified by the “SB” and “SC” classification. Best usage of class SB waters includes swimming, primary recreation, and all Class SC uses including fishing, secondary recreation, fish and wildlife propagation, and other uses requiring lower water quality (NCDEM 1991). The waters in the vicinity of Morehead City Harbor are prohibited shellfish areas.

## **CULTURAL RESOURCES**

The Morehead City Harbor Section 933 study has been reviewed pursuant to Section 106 of the National Historic Preservation Act (16 USC 470 et seq.) and the Abandoned Shipwreck Act (43 USC 2101 et seq.). This review has included consultation with the North Carolina State Historic Preservation Officer and staff of the NC Division of Archives and History Underwater Archaeology Unit and indicates that six archaeological sites have been recorded along the Bogue Banks beaches. Some of these sites consist of transient wreckage that has washed ashore from ships lost nearby in offshore waters.

- 0001BBB     Iron Steamer Pier Wreck Site  
Believed to be the Civil War blockade-runner *Pevensey*, an iron-hull side-wheel steamer, lost June 9, 1864. The wreck is located approximately 100 yards offshore on the east side of the pier lying almost parallel to the beach. Portions of a paddle wheel are visible during low tide.
- 0002BBB     Gun Emplacement Site  
Granite stones located in the surf zone adjacent to the 6200 block of Ocean Drive at Emerald Isle, believed to be from a World War II coastal shore battery exposed by beach erosion.
- 0003BBB     Salter Path Site  
Ship timbers 14” square, approximately 42 feet and 18 feet long with 1.25” diameter iron fasteners located roughly 1200 feet east of the beach access road near Squatters Campground.
- 0004BBB     Cupola Site  
Portions of a ship hull approximately 30’ long and 14’ wide fastened with iron pins, yellow pine planking on oak frames. This site is located in the surf zone near 18<sup>th</sup> Street, Emerald Isle. (Tag Numbers 134, 135)
- 0005BBB     Emerald Isle Pier Wreck

Ship timber 40' long, 12" x 18" square, iron fasteners and one attached frame. This site is located near Emerald Isle Fishing Pier. (Tag Numbers 155, 156)

0006BBB     Ocean Reef Site  
Ship wreckage covering an area of approximately 100' by 35' near the Ocean Reef Condos (marked by a warning sign on the beach). This site consists of extensive debris with iron fasteners.

## **AESTHETIC RESOURCES**

The Carteret County beach communities of Pine Knoll Shores, Indian Beach, and Salter Path that are located in the Section 933 project area, provide a vacation area for millions of visitors each year. The beaches within the Section 933 project area are used extensively for recreation. This includes sunbathing, swimming, surf fishing, jogging, bird watching and sightseeing. Public access with parking or public transportation will be available along the Section 933 project area as outlined in Appendix E – Exhibit 1.

## **ENVIRONMENTAL CRITERIA AND CONSTRAINTS**

No environmental constraints were identified which would preclude implementation of a Section 933 project at Pine Knoll Shores, Indian Beach, and Salter Path. However, any plan of improvement should be designed and implemented, to the extent practicable, to avoid impacts on the threatened species known to occur along the Section 933 project area (see Table 7).

Generally, any plan of improvement should be designed to avoid adverse impacts on water quality and biological resources. Also, the timing of project construction should be adjusted as practicable to avoid periods of high biological productivity. Methods to minimize impacts to these periods of high biological productivity are found in the attached EA.

As noted above, the aesthetic qualities of the beach strand at Pine Knoll Shores, Indian Beach, and Salter Path will probably continue to be degraded as erosion encroaches on development. Therefore, there is an opportunity to enhance this aspect of the island's aesthetic quality by restoration of the beachfront.

## **SECTION V - PLAN FORMULATION**

This report section describes the procedures by which the Recommended Plan of improvement was developed and ultimately selected. The Recommended Plan, which may also be referred to as the Section 933 Project, includes approximately 7.2 miles of beachfront, and is the maximum project area that has been identified within the Study Area. The non-Federal sponsor prefers a project that covers the maximum project area.

### **PLAN FORMULATION RATIONALE**

A Section 933 project would consist of a beach berm project to control erosion and reduce wave overwash during storms. Beneficial use of dredged material for a Section 933 project for hurricane and storm damage reduction is limited to the volume of dredge maintenance material required to be removed from the navigation project due to channel shoaling and is also limited to operation and maintenance funds available for maintaining the project. Furthermore since dredged volumes are tied to the navigation project, the typical plan optimization (identification of the NED Plan based on maximum net average annual benefits) is not required. Therefore only one plan need be evaluated to determine economic feasibility.

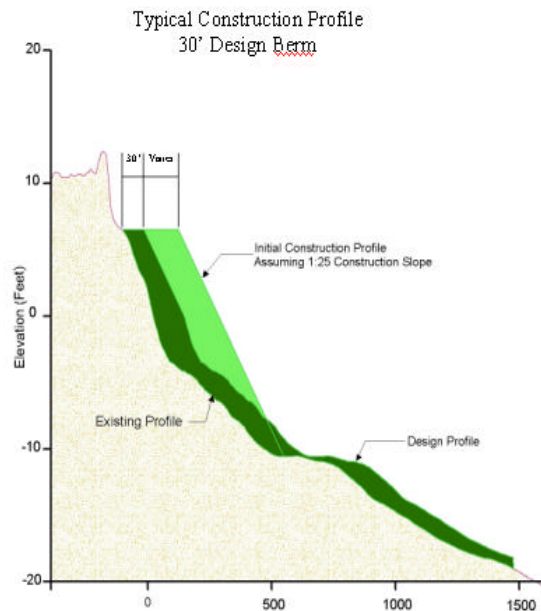
### **ALTERNATIVE PLANS**

As explained above, only one plan need be evaluated in determining economic feasibility. The Recommended Plan, therefore, was the only plan considered in great detail. Although the Recommended Plan was the only plan analyzed in detail, there were several plans initially assessed which would have provided protection for a number of different combinations of areas within the Study Area and the Base Disposal Plan Area. These plans were used as tools to assist in the initial determination of the one plan to evaluate in more detail. The recommended project area was evaluated since: (1) this area has had consistent development and erosion has weakened the protective dune; (2) there are no significant environmental constraints associated with these reaches; and (3) The non-Federal sponsor prefers a project that covers the maximum project area.

## SECTION 933 RECOMMENDED PLAN

The Recommended Plan would consist of constructing a sand berm along the oceanfront at an elevation of 7 feet above NGVD, which mimics the natural berm elevation in the Study Area. The design berm ties into the existing dune system at + 7 ft NGVD, extends 30-ft seaward, and transitions at a 1V:25H slope to the Mean Tide Level (MTL). The offshore portion of the profile then parallels the preplacement profile slope out to closure depth.

The construction profile will greatly differ from the design profile. Since it is not economically feasible to groom the offshore portion of the profile to mimic design profile conditions, it is common construction practice to place an equivalent volume of material in the upper part of the profile as shown in Figure 6. Natural wave conditions will restore the profile shape to equilibrium conditions, resulting in the design profile berm width. The increase in berm width during construction varies according to profile conditions. The average construction berm width for the project increased to 107 ft as compared to the 30-ft design berm width. Average volumetric requirements for the recommended plan were approximately 90 cubic yards per foot.



**Figure 6. Design and Construction Profile Conditions.**

It should be noted that existing dune conditions in the Project Area typically exceeded 15 ft NGVD. Such conditions exceed typical dune systems commonly incorporated into storm damage reduction projects. Therefore, dunes were not considered as an alternative. The 30-foot design berm width along the entire study area (7.2 miles) is expected to provide increased protection against long-term erosion.

The Recommended Plan includes a transition zone at the west end of the main fill. Since the fill will cause the shoreline to protrude seaward, the west end of the fill will erode rapidly unless measures are taken to terminate the fill with a gradual transition. The transition zone at the west end of the fill is 1,000 feet long. The transition fill will taper into the existing system. The east end of the main fill will tie into the base disposal main fill.

The Recommended Plan would be constructed by hydraulic dredges (pipeline and hopper with pump out capability) using the navigation project areas shown on Figure 3. The material would be pumped from the navigation project areas to the beach and shaped by earth moving equipment. The beachfill would be constructed at an elevation of +7-feet NGVD, the elevation of the existing beach berm along the project reaches. A benefits and costs discussions for the Recommended Plan follows.

## **BENEFITS AND COSTS FOR THE RECOMMENDED PLAN**

Benefits for the Recommended Plan as well as the Base Disposal Plan, the disposal plan that would be used in the without project condition as determined by the Federal Standard, are shown below in Table 8.

**TABLE 8**

### **EXPECTED ANNUAL BENEFITS FOR RECOMMENDED PLAN**

(Based on 5-7/8 percent interest rate, 20-year Period of analysis)  
(October 2002 price levels)

#### **Benefit Category**

Hurricane and Storm Damage Reduction	\$8,950,000
Emergency	\$ 122,000
Recreation	\$ 1,009,000
Benefits During Construction	<u>\$ 574,000</u>
Expected Annual Total Benefits	\$10,655,000

## **BENEFITS FOREGONE**

Benefits foregone were evaluated for those reaches that are located within the Base Disposal Plan (Atlantic Beach and Fort Macon) that would not receive the entire dredge disposal due to the proposed Section 933 project. There are no benefits foregone related to emergency costs or recreation, only hurricane and storm damage reduction. The total expected annual benefits foregone are estimated at \$705,000. This amount is added to the cost side of the Section 933 Project to account for the lower level of protection that the Base Disposal Plan would have offered Atlantic Beach and Fort Macon.

## COSTS FOR RECOMMENDED PLAN

First costs for the Recommended Plan and the Base Disposal Plan are shown in Table 9. The costs between the two plans vary proportionately to the volume of the fill and the distance the fill is located from the navigation project areas. Expected annual costs of the recommended Section 933 Project are shown in table 10 and presented in Appendix H.

**TABLE 9  
FIRST COST SUMMARY**

Description	Sand Placement Location	Costs
<b>TOTAL SECTION 933 PROJECT + MODIFIED DISPOSAL PLAN:</b>		
Mobilization & Demobilization		\$2,850,000
Pumpout Brandt Island & Inner Harbor	Fort Macon & Atlantic Beach	\$3,706,654
Pumpout Brandt Island, Inner Harbor, & Entrance Channel	AB, PKS, & IB	\$24,654,870
Embankment Replacement		\$500,000
Beach Tilling		\$137,600
Planning Engineering & Design		\$375,000
Construction Management		\$100,000
SUBTOTAL before Contingencies		<b>\$32,324,124</b>
Contingencies (10%)		\$3,211,876
<b>TOTAL Section 933 Project + Modified Disposal Plan</b>		<b>\$35,536,000</b>
<b>BASE DISPOSAL PLAN:</b>		
Mobilization & Demobilization		\$1,750,000
Pumpout Brandt Island & Inner Harbor	Atlantic Beach and Fort Macon	\$10,737,600
Mobilization & Demobilization		\$250,000
Dredge Entrance Channel	Near Shore Disposal Area	\$3,900,000
Embankment Replacement		\$500,000
Beach Tilling		\$130,400
Planning Engineering & Design		\$120,000
Construction Management		\$50,000
SUBTOTAL before Contingencies		<b>\$17,438,000</b>
Contingencies (10%)		\$1,744,000
<b>TOTAL Base Disposal Plan</b>		<b>\$19,182,000</b>
<b>SECTION 933 PROJECT COSTS</b>		<b>\$16,354,000</b>

Note: The percentage of the Section 933 Project costs (\$16,354,000) to the total Section 933 Project plus the Modified Disposal Plan (\$35,536,000) is 46.0 percent.



**TABLE 10**

**EXPECTED ANNUAL COSTS FOR RECOMMENDED PLAN**  
(Based on 5-7/8 percent interest rate, 20-year Period of analysis)  
(October 2002 price levels)

<b>Total Project Summary</b>	<b>Total 933 Project</b>	<b>Base Disposal Plan</b>	<b>Difference to be Justified</b>
<b>Total Initial Construction:</b>	\$36,927,000	\$20,573,000	\$16,354,000
Interest During Construction	\$708,000	\$0	\$708,000
<b>Total Investment Cost</b>	<b>\$37,644,000</b>	<b>\$20,573,000</b>	<b>\$17,062,000</b>
<b>Expected Annual Cost:</b>			
I&A-20 years			\$1,473,000
Annual Benefits Forgone			\$705,000
<b>Total Expected Annual Cost</b>			<b>\$2,178,000</b>

**SUMMARY OF BENEFITS AND COSTS, SECTION 933 PLANS**

Table 11 summarizes benefits and costs for the Recommended Plan. As shown in this table, the Recommended Plan would produce benefits greater than costs. This plan would provide effective protection for long-term shore erosion.

**TABLE 11**  
**EXPECTED ANNUAL BENEFITS AND COSTS**  
**OF THE RECOMMENDED PLAN**

Expected Annual Total Benefits	\$10,655,000
Expected Annual Total Costs	\$2,178,000
Benefit-to-Cost Ratio	4.9

### **RATIONALE FOR DESIGNATION OF RECOMMENDED PLAN AND PLAN SELECTION**

The Recommended Plan would control progressive erosion and minimize permanent land losses. The plan would reduce damages to structures caused by short-term, storm-induced erosion. The plan is considered to be environmentally acceptable. As discussed previously, the National Objective for Federal water resources projects is to contribute to the National Economic Development.

## **SECTION VI - RECOMMENDED PLAN OF IMPROVEMENT**

The purpose of this report section is to centralize information concerning the Recommended Plan of Improvement for the Section 933 Project. The Recommended Plan is discussed in terms of (1) Plan Features, (2) Construction, (3) Plan Accomplishments, (4) Plan Impacts, (5) Public Views and (6) Plan Implementation.

### **PLAN FEATURES**

The Recommended Plan of Improvement includes a 30-ft wide berm placed at 7-ft NGVD. Project dimensions are shown on Figure 7. The project will extend along the reaches shown on Figure 1. The total length of the main fill will be approximately 38,000 feet, which includes the 1,000-foot transition zone on the west end of the main fill.

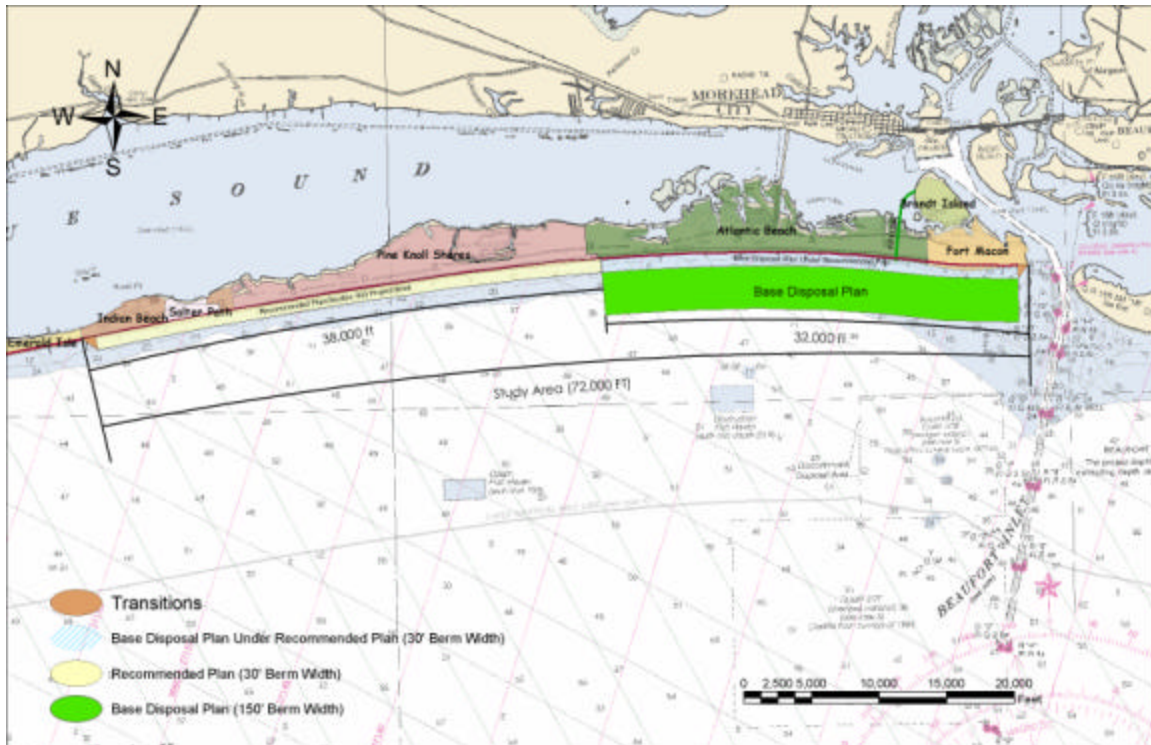


Figure 7. MHC Section 933 Recommended and Base Disposal Plans

## PROJECT CONSTRUCTION AND OPERATION

Project construction will make use of approximately 4,466,000 cubic yards of sand for the Recommended Plan. The material will be pumped to the beach by pipeline dredge and/or hopper dredge with pump out capability and shaped on the beach by earth moving equipment.

### NAVIGATION PROJECT AREAS AND FILL MATERIAL

Navigation project areas to be dredged and the material to be used for beachfill are located as shown on Figure 3. Based on grain size analysis of samples taken in these areas from the previous placements of material from Brandt Island and Morehead City Harbor maintenance onto Bogue Banks, it is reasonably confident that the navigation project areas contain good quality beach sand, which will be verified prior to placement on the beaches (see Appendix G for additional details on the geotechnical analysis).

Brandt Island, the inner harbor and the entrance channel will be the major sources of sand for the construction of the Section 933 project. The volume of material remaining on the beach immediately following placement will be reworked (sorted) by wave action into a distribution of material sizes from the berm crest seaward to closure depth that will closely mimic the native material distribution. This sorting process will take several months to occur and will result in the removal of the remaining excess material from the design template.

Generally, the material removed by this sorting action will be the finer fraction of the sandy material, which will be transported to offshore depths greater than 27 feet below NGVD.

## **OPERATION AND MAINTENANCE**

There are no operation and maintenance requirements associated with the Section 933 project. All benefits to the Section 933 Project will accrue without operation and maintenance.

## **GEOTECHNICAL PROCESS**

Morehead City Harbor dredge material has traditionally been placed in Brandt Island or on the beach at Atlantic Beach and Fort Macon. The material in Brandt Island was sampled and grain size tests were performed in the mid-1980's prior to the initial pump out in 1986. The quality of the material was determined to be suitable for beach disposal. Brandt Island was pumped out again in 1994 with the material being disposed of on the beach.

The subsurface investigation will include drilling the shoals in Morehead City Harbor and taking beach grab samples, and grain size testing the material collected from these samples. Twenty-one, 10-foot vibracore borings in the Harbor area and the connecting channels with the worst shoals were drilled on March 26, 2003. The borings were performed with the snagboat *SNELL* using a 3 7/8 inch diameter Alpine vibracore drill machine. The tubes were sampled for representative material and at a minimum of one sample for every two feet of recovered length. Each tube is expected to have approximately 3 soil samples for a total of approximately 60 samples. No borings will be performed on Brandt Island as part of this project. It is assumed that the material in Brandt Island is the same as the inner Harbor material tested for this project, since the Inner Harbor material from previous dredging is stored in Brandt Island. Grab samples will be collected from twenty-five profile lines perpendicular to Fort Macon, Atlantic Beach, Pine Knoll Shores, Indian Beach, Emerald Isle, and Bogue Inlet Area for a total of 150 samples. These samples will be tested for grain size, silt content, shell content in accordance with ASTM D 422 using a minimum of 12 sieves. Samples will be classified in accordance with the Unified Soils Classification system.

All the samples collected from the Harbor Shoal material and the beach grab samples will be analyzed to determine the material suitability for beach placement. Based on material removed from the Inner Harbor and Brandt Island in the past, it is expected that the material designated for beach placement as part of this project will be suitable.

## **REAL ESTATE REQUIREMENTS**

Real estate requirements for the Recommended Plan of Improvement include lands, easements, rights-of-way and relocations, and disposal/borrow areas, which are referred to as LERRD's. Existing easements are in places that were acquired by the sponsor for a local, non-federally funded project. The easements incorporated the standard language in the Government Perpetual Storm Damage Reduction Easement. It is anticipated that all work will be completed within the limits of the existing easements and/or seaward of these easements. In order for Real Estate to be certified for this project, the project sponsor will be required to supply CESAS-RE with a map and copies of their existing easements. Per discussion with The North Carolina Department of Administration, the State of North Carolina does not require a permit to place sands below the mean high water line. However, the Local Sponsor will need to furnish the State of North Carolina Department of Administration with a letter of intent to place sand below the Mean High Water Line.

Other things that are to be considered are access to the beach during construction, additional pipeline routes, and temporary work area easements. Access to the beach will be by public access points that are located along the beach area. A previously acquired perpetual pipeline easement will be used for the placement of the pipeline. Should additional pipeline routes be identified, the project sponsor will be responsible for acquisition. Additional details of the Real Estate Requirements are discussed in Appendix F.

## **PLAN ACCOMPLISHMENTS**

The Recommended Plan reduces expected annual damages to structures due to hurricane-wave action and storm induced erosion. As shown in Table 5, existing expected annual damages for hurricane and storm damage are estimated at \$14,543,000 without a Section 933 project in place in the Study Area. With the Recommended Plan in place expected annual hurricane and storm damages are reduced to about \$5,593,000. Thus, as stated above, the Recommended Plan would reduce hurricane and storm damages by an expected annual amount of \$8,950,000 for the 7.2-mile-long Section 933 project area, or about 62 percent.

Although the plan will substantially reduce damages due to hurricane-wave overwash, it should be noted that the Recommended Plan of Improvement provides for storm protection only in terms of protecting development from the action of ocean storm surge and wave action.

## **BENEFITS**

Total expected annual benefits for the Recommended Plan are estimated at \$10,655,000 based on October 2002 price levels. An itemized listing of expected annual benefits was presented in Table 6. If the plan is to be

recommended for implementation, expected annual costs must be less than this amount. Project costs are discussed below.

## **PROJECT COSTS**

Determination of the economic costs of the Recommended Plan consists of two basic steps. First, project first costs are computed. First costs include expenditures for project design and construction and related costs of supervision and administration. First costs also include the lands, easements, and rights of way for project construction.

Second, interest during construction is added to the project first cost. Interest during construction is computed from the start of PED through the construction period. The project first cost plus interest during construction represents the total investment required to place the project into operation.

These costs consist of interest and amortization of the investment. The expected annual costs provide a basis for comparing project costs to project benefits. A summary of the computations involved in each of these two steps is presented below.

**Project First Costs** - The total first cost of construction for the Recommended Plan is estimated at \$16,354,000, based on October 2002 price levels. An itemized listing of first costs is presented in Table 9.

**Interest During Construction** - Interest during construction, computed over PED and the construction period, is established at \$708,000 for the Section 933 Project Area. The total investment required to place the project into operation would be \$17,062,000 for the Section 933 Project Area.

**Expected Annual Costs** - Expected annual costs include interest and amortization of the investment over an assumed project life of 20 years. As shown in Table 10, expected annual costs for the Selected Plan of Improvement are estimated at \$2,178,000 for the Section 933 Project Area.

**Benefit-Cost Ratio** - The Recommended Plan produces expected annual benefits estimated at \$10,655,000 for the Section 933 Project Area. Expected annual costs for the Recommended Plan are estimated at \$2,178,000 for the Section 933 Project Area. Thus benefits divided by costs results in a benefit-cost ratio of 4.9 for the Section 933 Project Area. Since project benefits exceed costs, the Recommended Plan is considered economically feasible.

## **ENVIRONMENTAL IMPACTS**

The Recommended Plan of Improvement is considered to be environmentally acceptable, although some environmental impacts are anticipated. Significant resources likely to be affected by the Recommended Plan include biological resources, water quality, aesthetic values, and threatened

species. The proposed action will not cause any significant impacts to the environment (see attached EA). No effect on cultural resources is anticipated. Anticipated impacts on each resource are discussed below.

## **IMPACTS ON BIOLOGICAL RESOURCES**

Biological resources will be affected by dredging of material from Brandt Island and the Morehead City Harbor navigation channels for project construction and by placement of this material on the beach. The sediments taken from Brandt Island and the Morehead City Harbor navigation channels is believed to be suitable for placement on the beaches of Bogue Banks. As indicated in the attached EA, Brandt Island has been previously pumped out in FY 1986 and FY 1994 and the resultant dredge material placed on the beaches of Bogue Banks. Expected impacts on biological resources due to dredging and fill placement are discussed on the following pages.

**Navigation Project Area Dredging** - No significant impact on biological resources is expected due to piping of dredged material from the navigation project areas (including Brandt Island) to the beachfill areas. The pipeline route will extend from the navigation project areas and Brandt Island to the beach and then will follow the shoreline.

There will be some loss of dune vegetation where the pipeline crosses the dune to the beach. Plants growing adjacent to the seaward side of the dunes will be buried by the discharge of dredged material. Dune vegetation disturbed by the pipeline crossing to the beach will be restored to pre-project grade and replanted following project completion.

Negative impacts associated with pipeline routes will be minor and temporary.

**Beachfill Construction** - The major impacts associated with this type of operation include:

- A. Increased turbidity in the surf zone;
- B. Effects on the benthic communities;

During disposal operations, there will be an increase in the turbidity of the surf zone in the immediate area of sand disposition. This increase may cause the temporary displacement of various species of sport fish, causing a negative impact to surf fishing in the area of deposition.

A considerable body of information is available on the effects of dredging on benthic communities and specific environmental consequences of beach disposal. However, there are some uncertainties on the degree of impacts on certain resources over the long term. A more detailed discussion is found within

the FONSI.

## **ENDANGERED AND THREATENED SPECIES**

As noted previously, species which could be present in the project area during the proposed action are the finback whale, humpback whale, right whale, sei whale, sperm whale, West Indian manatee, piping plover, roseate tern, green sea turtle, hawksbill sea turtle, Kemp's ridley sea turtle, leatherback sea turtle, loggerhead sea turtle, shortnose sturgeon, and sea-beach amaranth. Some of these species may be affected by construction of the Recommended Plan of Improvement. The greatest potential for impacts to the endangered and threatened sea turtle species found within the project area is for beach disposal from 1 May to 15 November of any year, and hopper dredging from April 1 to December 31. Potential project impacts to these species are discussed below and more detailed information is found in the FONSI.

**Loggerhead, Kemp's Ridley, and Green Sea Turtles** - All of these turtles are known to nest in North Carolina and could nest in the project area. For this reason, they may be affected by the project construction.

In order to minimize impacts on nesting sea turtles, beach disposal sand should match natural sand as closely as possible. Before any dredged maintenance material is pumped from Brandt Island and/or Morehead City Harbor maintenance, onto Bogue Banks beaches, we will assure that the material is suitable for beach disposal. The type of material used for beachfill should not affect sea turtles. Also, beach tilling will be accomplished for the purpose of loosening the sand fill set, which hardens and makes nesting by sea turtles difficult.

Sea turtle monitoring and nest relocation will be required during construction if disposal occurs during the sea turtle nesting season (1 May to 15 November). Sea turtles also occur in the entrance channel proposed for dredging and may be affected (by take) since hopper dredges may be used for maintenance dredging and pump out for beach disposal along the Project Area. To minimize takes by a hopper dredge, work will be restricted from 1 January to 31 March.

As noted above, a monitoring and nest relocation program will be implemented when beach disposal occurs during the nesting season. However, even with this program in place, the possibility of accidental egg loss during nest relocation exists. Therefore, it has been determined that the project may adversely affect the loggerhead, Kemp's ridley, and green sea turtles.

During the period of sea turtle nesting and hatching (1 May through 15 November), all lighting associated with project construction shall be minimized to the maximum extent practicable while maintaining compliance with all safety requirements. Reduced wattage and special fixtures or screens to reduce illumination of adjacent beach and near shore waters shall be used if practical.



Lighting on offshore equipment shall also be minimized to the maximum extent practicable while meeting Coast Guard requirements. Shielded low pressure sodium vapor lights are highly recommended for all lights on the beach or on offshore equipment.

**Piping Plover** - Because beach disposal may temporarily impact foraging habitat and disrupt nesting that may be attempted along the eroded beach front, it has been determined that the project may affect the piping plover.

**Marine Mammals** - Marine mammals occur in offshore sites proposed for dredging. It is expected that these species can be detected by use of observers and avoided, therefore a no effect determination is proposed.

**Seabeach Amaranth** - While beach disposal will restore much of the habitat lost to erosion, disposal on a portion of the beaches in the growing season during project construction may slow population recovery over the short term. Therefore, the project may affect seabeach amaranth.

## **IMPACTS ON WATER QUALITY**

The proposed project will result in elevated turbidity and suspended solids compared to the existing non-storm conditions of the surf zone in the immediate area of beachfill. Due to the low percentage of silt and clay in Brandt Island and the Morehead City Harbor navigation channels (averaging less than 10 percent), this impact is not expected to be greater than the natural increases in turbidity and suspended material during storm events. Discharge of sediment that is predominantly sand would be required for beach disposal. Such discharge would occur within the 3-mile limit and therefore would be subject to regulation under Section 404(b)(1) of the Clean Water Act of 1977, as amended and will require a Section 401 (P.L. 95-217) State of North Carolina Water Quality Certificate.

It is expected that dredged disposal on the beach would result in turbidity and suspended solids concentrations that are elevated over normal background levels in the navigation project areas during dredge excavation and in the surf zone in the immediate area of beach disposal operation. No other water quality parameters are anticipated to be impacted significantly during dredge channel maintenance, pumpout of Brandt Island, and beach disposal.

The degree of water quality impacts associated with navigation maintenance dredging activities and beach disposal has been evaluated during this study and presented in the attached FONSI. Investigations indicated that suitable material would be used for beach disposal; therefore water quality impacts would not be significant.

## **IMPACTS ON AESTHETIC RESOURCES**

Aesthetic impacts of project construction are expected to be both positive and negative. The aesthetics of the beach would temporarily be degraded during beach disposal due to the presence of heavy equipment and pipeline on the beach and elevated turbidity in the surf zone. Noise and exhaust created by the operation of the dredge and other equipment will result in minor increases in noise and air pollution. However, upon completion of the project, the aesthetics and recreational use of the beach should be enhanced due to the wider beach.

## **IMPACTS ON CULTURAL RESOURCES**

The Wilmington District, in consultation with the NC Division of Archives and History Underwater Archaeology Unit, have considered both the potential impact of the project and the nature of the known resources, and have determined that the information does not support a recommendation for an archaeological survey of the entire beach area. However, it is possible during the course of construction that vessel remains will be encountered. Therefore, the Underwater Archaeology Unit has requested that Wilmington District personnel, contractors, and others be aware that the possibility exists that this work may unearth a beached shipwreck. In the event that such occurs, work should move to another area and the Underwater Archaeology Unit should be contacted immediately at telephone number (910) 458-9042. A staff member will be sent to assess the wreckage and, if practical, undertake appropriate documentation.

## **CUMULATIVE IMPACTS**

A cumulative analysis of the impacts of existing, proposed and potential projects involving beach disposal, is found in Attachment E of the Draft Evaluation Report and Environmental Assessment, Morehead City Harbor, Section 933, Carteret County, North Carolina, dated May 2003. General impacts of beach disposal on other North Carolina beaches are considered to be similar to those described herein. The degree of cumulative impact would increase proportionally with the total length of beach impacted. This analysis quantifies these impacts in terms of the percent of North Carolina beaches affected on an annual and total basis by sand disposal for maintenance of Federal navigation channels, and existing, proposed or potential beach disposal projects. Cumulative impacts of the proposed action appear negligible.

## **SUMMARY OF ENVIRONMENTAL IMPACTS**

Adverse environmental impacts associated with the proposed action include (1) Destruction and displacement of intertidal and benthic fauna during construction; (2) temporary increases in turbidity and suspended solids during construction and disposal operations; and (3) it has been determined that the project, as currently proposed, may affect the piping plover, green sea turtle, loggerhead sea turtle, hawksbill sea turtle, leatherback sea turtle, Kemp's ridley sea turtle, and seabeach amaranth. A program of monitoring and nest relocation will be implemented to mitigate adverse impacts on the sea turtles when fill placement overlaps the sea turtle nesting season. Additionally, the Corps will continue to monitor seabeach amaranth during the growing season (1 July to September 30).

## **MITIGATION REQUIREMENTS**

The term "mitigation requirements," as used herein refers to actions necessary to reduce or compensate for adverse environmental impacts of the project. Overall environmental impacts are expected to be minor, due to the scope, location, and timing of project activities. However, project construction may occur during the nesting season of the loggerhead sea turtle, green sea turtle, and Kemp's ridley sea turtle (1 May through 15 November). A beach monitoring and nest relocation program will be implemented to mitigate impacts on these species as discussed in the FONSI.

## **PUBLIC VIEWS**

The Recommended Plan is considered acceptable to local interests. Required coordination related to the environmental permits and entitlements necessary for project construction is discussed in detail in the Environmental Assessment. Local views and the views of the State of North Carolina are summarized below. Additional views were received during public and agency coordination of the Evaluation Report and Environmental Assessment.

### **VIEWS OF THE LOCAL SPONSOR**

The Recommended Plan of Improvement is considered to be acceptable to, and supported by, the local sponsor, Carteret County (see Appendix A, Exhibit 3.)

### **VIEWS OF THE STATE OF NORTH CAROLINA**

The State of North Carolina, Department of Environment and Natural Resources, Division of Water Resources, supports the Recommended Plan of Improvement.

## **SUMMARY OF PLAN EFFECTS**

Table 12 provides a summary of project effects. Effects are evaluated in the following categories: (1) National Economic Development (NED), which reflects the plan's economic justification; (2) Environmental Quality, which evaluates the plan's environmental acceptability; (3) Regional Economic Development; and (4) Other Social Effects, including health and safety.

Effects in these four categories encompass significant effects on the human environment as required by the National Environmental Policy Act of 1969, as amended. They also encompass social well being as required by Section 122 of the Flood Control Act of 1970. For purposes of comparison, the effects of the Selected Plan are evaluated against the "without project" or "no action" condition.

**TABLE 12**

**SUMMARY OF PLAN EFFECTS OF SECTION 933 PROJECT AREA**

	<u>RECOMMENDED PLAN</u>	<u>"NO ACTION"</u>
1. NATIONAL ECONOMIC DEVELOPMENT		
<u>Beneficial Contribution</u>		
Expected Annual Benefits:		
Hurricane Storm Damage Reduction	\$8,950,000	None
Emergency Costs and Other Damage Reduction	\$ 122,000	None
Recreation	\$ 1,009,000	None
Benefits During Construction	\$ 574,000	None
Total Expected Annual Benefits	\$10,655,000	
<u>Adverse Contributions</u>		
Expected Annual Costs:		
Interest & Amortization	\$ 1,473,000	Continuation of hurricane and storm damages along with damages due to progressive beach erosion.
Annual Benefits Foregone	\$ 705,000	
Total Exp. Annual Costs 933 Project Area	\$ 2,178,000	

## 2. ENVIRONMENTAL QUALITY

<u>Beneficial Contribution</u>	None	None
<u>Adverse Contribution</u>		
a. Water Quality and Aquatic Resources	*Increased turbidity during construction	None
b. Vegetation and Wetlands	*Minimal impact	None
c. Wildlife Habitat	*Destruction and displacement of intertidal and benthic fauna during construction; effect will be temporary, but will recur over life of project.	None
d. Aesthetic Value	*Minimal impact	Continued loss of aesthetic values of oceanfront as erosion intrudes upon development.
e. Air and Noise Pollution	*Increased air and noise pollution during construction	None
f. Threatened and Endangered	*Possible adverse impacts on loggerhead sea turtle, green sea turtle, Kemps ridley sea turtle, and leatherback sea turtle. When fill placement occurs during the sea turtle nesting season, a nest monitoring and relocation program will be implemented.	None
g. Cultural Resources	None	None

**TABLE 12 (continued)**

**SUMMARY OF PLAN EFFECTS OF SECTION 933 PROJECT AREA**

	<u>RECOMMENDED PLAN</u>	<u>"NO ACTION"</u>
<b>3. REGIONAL ECONOMIC DEVELOPMENT</b>		
<u>Beneficial Contribution</u>		
Increased Income and Employment	*Minimal portion of project cost returned to local economy	None
<u>Adverse Contributions</u>		
Increased Income and Employment	None	*Potential loss of tourism income due to beach erosion
<b>4. OTHER SOCIAL EFFECTS</b>		
<u>Beneficial Contributions</u>		
Enhancement of community social well being, health and safety	*Reduction of hurricane and storm hazard along with shoreline stabilization is expected to have favorable impact on social well being and safety; net effect not quantified	None
<u>Adverse Contributions</u>		
Enhancement of community social well being, health and safety	*Minor and temporary inconvenience due to construction activities	*Continued threat of erosion along with hurricane and storm damages

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\*Effect specified in Section 122 of PL 91-611

## PROJECT SCHEDULE

The schedule for the Section 933 Project through initial construction is shown below. This schedule assumes expeditious review and approval of the project through all steps, including ASA(CW) approval and funding. Actual project implementation would follow as shown on the proposed schedule.

<u>Date</u>	<u>Milestone</u>
February 10, 2003	Initiate Plans and Specs
March 31, 2003	CESAW provides report to CESAD and HQUSACE for review and approval
April 30, 2003	HQUSACE approves Section 933 Report
May 9, 2003	CESAW sends PCA, Financial Plan, Letters of Support from Carteret County and State of North Carolina to HQUSACE
May 9, 2003	HQUSACE provides Report to ASA(CW) 6-weeks before submitting the PCA for approval
June 2, 2003	HQUSACE approves PCA Package
June 16, 2003	HQUSACE provides PCA to ASA(CW) for approval
June 30, 2003	ASA(CW) approves PCA
July 7, 2003	Carteret County and CESAW sign PCA
July 14, 2003	Carteret County provides cash contribution
July 14, 2003	Carteret County and State of North Carolina provide all Lands, Easements, Rights-of-Way, Etc (Including evidence of legal authority to grant Right-of-Entry) and CESASRE certifies Real Estate for Project
July 25, 2003	Complete Plans and Specs
August 1, 2003	CESAW sends out Solicitation for Bids - "Advertise"
September 4, 2003	Bids are Opened by CESAW
September 26, 2003	Contract Award
October 31, 2003	CESAW gives "Notice to Proceed"
November 15, 2003	Begin Dredging
April 30, 2005	Complete Dredging
	<b>Evaluation Report</b>



## DIVISION OF PLAN RESPONSIBILITIES

Federal policy concerning cost sharing for water resources projects requires that project costs be allocated to the various purposes served by the project; these costs are then apportioned between the Federal Government and the non-Federal sponsor according to percentages specified in Federal guidelines. As shown in Table 13, all project costs are allocated to the purposes of "Section 933 - Beneficial Use of Dredged Material for Hurricane and Storm Damage Reduction." Under current Federal policy, costs allocated to this category are shared with the Federal Government paying 65 percent and the non-Federal sponsor paying 35 percent for project construction. Private-use shores are cost shared at 100 percent by the non-Federal sponsor. Based on the findings in this report (see Appendix E), Carteret County is eligible for 65.0% Federal and 35.0% non-Federal sponsor cost sharing for the added cost of depositing dredged navigation material on the requested sections of the beaches of Pine Knoll Shores, Indian Beach, and Salter Path, under authority of Section 933 of PL 99-662.

**TABLE 13**

### **COST ALLOCATION AND APPORTIONMENT**

#### **PROJECT CONSTRUCTION**

##### SECTION 933 PROJECT AREA

<u>Project Purpose</u>	<u>Project First Cost</u>	<u>Apportionment (%)</u>		<u>Apportionment (\$)</u>	
		<u>Non-Federal</u>	<u>Federal</u>	<u>Non-Federal</u>	<u>Federal</u>
Section 933	\$16,354,000	35.0%	65.0%	\$5,724,000	\$10,630,000

As shown above, the non-Federal and Federal shares of initial project construction are estimated at \$5,724,000 and \$10,630,000 respectively for the Section 933 project.

## **SECTION VII - CONCLUSIONS AND RECOMMENDATIONS**

### **CONCLUSIONS**

I have given consideration to all significant aspects in the overall public interest, including engineering feasibility and economic, social, and environmental effects. The Recommended Plan of Improvement described in this report provides an economical feasible solution for the beneficial use of dredged material for hurricane and storm damage reduction for the Section 933 project area, which includes Pine Knoll Shores, Indian Beach, and Salter Path.

### **RECOMMENDATIONS**

This study has addressed the beneficial use of dredged material from the Morehead City Harbor navigation project to meet the needs for hurricane and storm damage protection for the 7.2-mile shoreline reach which includes the communities of Pine Knoll Shores, Indian Beach, and Salter Path in Carteret County, as requested by the non-Federal sponsor, Carteret County and also as requested by the State of North Carolina.

I recommend that the Recommended Plan of Improvement described herein as the "Section 933 Project," and selected herein for the purposes of beneficial use of dredged material from the Morehead City Harbor navigation project for hurricane and storm damage reduction for the Pine Knoll Shores, Indian Beach, and Salter Path Project Area, be approved for implementation as a Federal Section 933 project, with such modifications as in the discretion of the Chief of Engineers may be advisable; at a first cost presently estimated at \$16,354,000, and an expected annual costs presently estimated at \$2,178,000. When compared to expected annual benefits of \$10,655,000, the Recommended Plan yields a benefit-to-cost ratio of 4.9. The recommended plan consists of a 7-foot NGVD, 30-foot wide, beach berm with a main fill length of 38,000 feet including a transition length of 1,000 feet at the west end of the project. The east end of the Project will tie in to the Base Disposal Area along the Atlantic Beach shoreline. Recommendations of this plan is made, provided that, except as otherwise provided in these recommendations, the exact amount of non-Federal contributions shall be determined by the Chief of Engineers prior to project implementation in accordance with the following requirements to which non-Federal interests must agree prior to implementation.

- a. Contribute 35 percent of total project costs for public shorelines and 100 percent for private shorelines.
- b. Provide all lands, easements, and rights-of-way, and suitable borrow and dredged or excavated material disposal areas that the Government determines the Non-Federal sponsor must provide for the construction of the Project, and

shall perform or ensure performance of all relocations that the Government determines to be necessary for the construction of the Project.

c. Do not use Federal funds to meet the non-Federal sponsors share of total project costs unless the Federal granting agency verifies in writing that the expenditure of such funds is authorized;

d. Assure continued conditions of public ownership and use of the shore upon which the amount of Federal participation is based during the life of the Project, in accordance with existing law and based on shore ownership and use existing at the time of construction;

e. Provide and maintain its current access roads, parking areas, and other public use facilities open and available to all on equal terms;

f. Be responsible for monitoring the nesting of sea turtles within the Project limits when construction occurs during the 1 May to 15 November nesting season;

g. Assure that dredged material placed under this Project is not removed or the configuration altered or the material is placed on privately owned land, nor shall the Non-Federal sponsor allow any third party to do so;

h. Hold and save the Government free from all damages arising from the construction, operation, maintenance, repair, replacement, and rehabilitation of the Project and any Project-related betterments, except for damages due to the fault or negligence of the Government or its contractors;

i. Keep and maintain books, records, documents, and other evidence pertaining to costs and expenses incurred pursuant to the project in accordance with the standards for financial management systems set forth in the Uniform Administrative Requirements for Grants and Cooperative Agreements to State and Local Governments at 32 Code of Federal Regulations (CFR) Section 33.20;

j. Perform, or cause to be performed, any investigations for hazardous substances that are determined necessary to identify the existence and extent of any hazardous substances regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Public Law 96-510, as amended, 42 U.S.C. 9601-9675, that may exist in, on, or under lands, easements, or rights-of-way that the Federal Government determines to be required for the construction, operation, and maintenance of the project. However, for lands that the Federal Government determines to be subject to the navigation servitude, only the Federal Government shall perform such investigations unless the Federal Government provides the Non-Federal sponsor with prior specific written direction, in which case the Non-Federal sponsor shall perform such investigations in accordance with such written direction;

k. Assume complete financial responsibility for all necessary cleanup and response costs of any CERCLA regulated materials located in, on, or under lands, easements, or rights-of-way that the Federal Government determines to be necessary for the initial construction, operation, or maintenance of the project;

l. Agree that the Non-Federal sponsor shall be considered the operator of the project for the purpose of CERCLA liability, and to the maximum extent practicable, operate, maintain, and repair the project in a manner that will not cause liability to arise under CERCLA;

m. If applicable, comply with the applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, as amended by Title IV of the Surface Transportation and Uniform Relocation Assistance Act of 1987 (Public Law 100-17), and the Uniform Regulations contained in 49 CFR Part 24, in acquiring lands, easements, and rights-of-way, required for the initial construction, operation, and maintenance of the project, including those necessary for relocations, borrow materials, and dredged or excavated material disposal, and inform all affected persons of applicable benefits, policies, and procedures in connection with said Act;

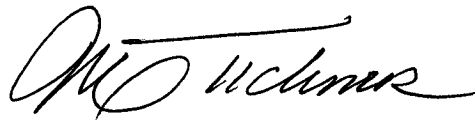
n. Comply with all applicable Federal and State laws and regulations, including, but not limited to, Section 601 of the Civil Rights Act of 1964, Public Law 88-352 (42 U.S.C. 2000d), and Department of Defense Directive 5500.11 issued pursuant thereto, as well as Army Regulation 600-7, entitled "Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army, and Section 402 of the Water Resources Development Act of 1986, as amended (33 U.S.C. 701b-12), requiring non-Federal preparation and implementation of flood plain management plan;.

o. Provide costs of that portion of total historic preservation mitigation and data recovery costs attributable to the Project that are in excess of 1 percent of the total amount authorized to be appropriated for the Project; and

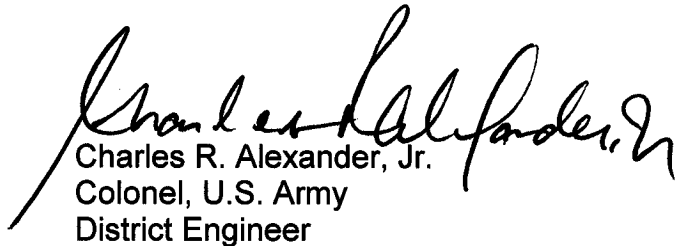
p. Recognize and support the requirements of Section 221 of Public Law 91-611, Flood Control Act of 1970, as amended, and Section 103 of the Water Resources Development Act of 1986, Public Law 99-662, as amended, which provides that the Secretary of the Army shall not commence the construction of any water resources project or separable element thereof, until the non-Federal sponsor has entered into a written agreement to furnish its required cooperation for the project or separable element.

The local sponsor has indicated that they have available the necessary funds to provide the non-Federal share of project costs. I am confident that the local sponsor will provide their share.

The recommendations contained herein reflect the information available at this time and current departmental policies governing formulation of individual projects. They do not reflect program and budgeting priorities inherent in the formulation of a national Civil Works operation and maintenance program nor the perspective of higher review levels within the Executive Branch.



W. Eugene Tickner, P.E.  
Deputy District Engineer,  
Programs and Project Management



Charles R. Alexander, Jr.  
Colonel, U.S. Army  
District Engineer





**US Army Corps  
of Engineers**

**WILMINGTON DISTRICT  
SOUTH ATLANTIC DIVISION**

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## FINDING OF NO SIGNIFICANT IMPACT

MOREHEAD CITY HARBOR  
SECTION 933

CARTERET COUNTY, NORTH CAROLINA

AUGUST 2003

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FINDING OF NO SIGNIFICANT IMPACT  
MOREHEAD CITY HARBOR, SECTION 933  
Carteret County, North Carolina

The responsible lead agency is the U.S. Army Engineer District, Wilmington.

**ABSTRACT:** The Draft Evaluation Report and Environmental Assessment (EA) was circulated to Federal and State agencies and the public on May 2, 2003. The EA described the proposed Section 933 project as the placement of up to 6.3 million cubic yards of material dredged from the pumpout of Brandt Island and the maintenance dredging of Morehead City Harbor on about 13 miles of Bogue Banks, from Fort Macon State Park to Indian Beach (including Salter Path). We estimated that the Section 933 project would take up to 16 months to complete (start November 16, 2003 and be completed by March 2005).

As a result of discussions and a June 24, 2003 meeting with the State and Federal agencies, the proposed Section 933 project has been modified. We still propose to place up to 6.3 million cubic yards of material dredged from the pumpout of Brandt Island and the maintenance dredging of Morehead City Harbor onto Bogue Banks, from Fort Macon State Park to Indian Beach (including Salter Path), a distance of about 13 miles. However, the time required to complete this proposed Section 933 project has been reduced, from up to 16 months to about 6 months (start the pipeline dredging on November 1, 2003 and may be completed by April 30, 2004). The contract solicitation will indicate this November 1, 2003 to April 30, 2004 period. However, if the contractor experiences mechanical problems with the pipeline dredge or booster pumps, we may have to extend the contract past April 30, 2004. This means that if the contractor experiences 13 days down time (from November 1, 2003 to April 30, 2004), he would be given 13 days in May to recover the down time. Under no circumstance, would the contractor be given an unequal amount of time (i.e., down 13 days and given 31 days to recover in May).

All pumping of material to the beach will be completed no later than May 31, 2004. Placement and removal of equipment (pipe, booster pumps, etc.) may be staged on the beach several weeks before November 1, 2003 and removed from the beach after May 31, 2004. If we have to work on the beach strand after May 1, 2004, we will initiate sea turtle monitoring and relocate any nests within the project area (as well as abide by the environmental commitments 1 and 2 found in Section 9.0 of the FONSI). Under no circumstances would we place material on Bogue Banks past the May 31, 2004 deadline. The hopper dredging would not change (start January 1, 2004 and be completed by March 31, 2004).

Carteret County has agreed to continue monitoring the Phase 1 area (Pine Knoll Shores to Indian Beach (including Salter Path)) beyond November 2003, if adequate recovery of mole crabs and coquina clams does not occur. If required the monitoring would be extended to November 2004. Please note if the Section 933



project is not funded, Carteret County **will not** extend the monitoring until November 2004.

If the Section 933 project is not funded, then the pumpout of Brandt Island and the maintenance dredging of Morehead City Harbor will be undertaken in accordance with the base disposal plan as described in the EA. After review and consideration of the comments received on the EA, the Finding of No Significant Impact (FONSI) was signed.

SEND YOUR COMMENTS TO THE DISTRICT ENGINEER AT THE ADDRESS BELOW.

For further information concerning this FONSI, please contact Mr. Hugh Heine, Environmental Resources Section, at the address below, by telephone at (910) 251-4070, or by e-mail at [hugh.heine@usace.army.mil](mailto:hugh.heine@usace.army.mil).

DISTRICT ENGINEER  
U.S. Army Engineer District, Wilmington  
P.O. Box 1890  
Wilmington, North Carolina 28402-1890

**FINAL EVALUATION REPORT AND FINDING OF  
NO SIGNIFICANT IMPACT  
MOREHEAD CITY HAROBR  
SECTION 933  
CARTERET COUNTY, NORTH CAROLINA  
AUGUST 2003**

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FINAL EVALUATION REPORT AND  
FINDING OF NO SIGNIFICANT IMPACT  
MOREHEAD CITY HARBOR, SECTION 933  
Carteret County, North Carolina

## **1.00 INTRODUCTION**

**1.01 Description and Location.** Morehead City Harbor is a deep-draft, federal navigation project located in the town of Morehead City, North Carolina, approximately 2.5 miles from the Atlantic Ocean through Beaufort Inlet (Figure 1 found in the EA). Morehead City Harbor is divided into two main parts: the outer harbor, which is made up of Range A (including extension and widener) and the Cutoff; and the inner harbor, which is made up of Ranges B and C, Northeast Leg, West Leg, East Leg (including extension), and Turning Basin (including extension).

On average, the Morehead City Harbor inner harbor navigation channels are maintained every two years by hydraulic pipeline with dredged material being placed either in the Brandt Island Upland Diked Disposal Area (hereafter referred to as Brandt Island) or the beaches on Bogue Banks. The Morehead City outer harbor navigation channels are usually maintained annually by hopper dredge and the resultant material is placed either in the United States Environmental Protection Agency (USEPA) designated Morehead City Ocean Dredged Material Disposal Site (ODMDS) or the previously approved nearshore area. The frequency of maintenance dredging in Morehead City Harbor is subject to the availability of funds.

Approval was obtained for deepening of the inner harbor navigation channels (including Range B and the Cutoff) from the existing 40 feet (plus 2 feet overdepth) to 45 feet (plus 2 feet overdepth) mean low water (mlw). Range A (Ocean Bar Channel) was also approved to be deepened from an existing depth of 42 feet (plus 2 feet overdepth) to 47 feet (plus 2 feet overdepth) mlw to account for wave action. Regularly scheduled maintenance dredging, deepening of the navigation channels and pumpout of Brandt Island were completed in Fiscal Year (FY) 1994.

Brandt Island is a 96-acre island, which has been used as a disposal area since about 1955. Brandt Island is owned and used as a sand-recycling site by the North Carolina State Ports Authority (NCSPA) and dedicated for the purpose of dredged material disposal. Brandt Island has a present capacity of about 3 million cubic yards, which can be increased by about 1 million cubic yards by reworking the dikes every four to five years. Every 8 to 10 years maintenance material is pumped out of Brandt Island and placed on the ocean beaches of Bogue Banks. In FY 1986 and FY 1994 approximately 3.9 million and 2.5 million cubic yards of dredged material were pumped out of Brandt Island and placed on Bogue Banks from Fort Macon State Park to Atlantic Beach, respectively.

**1.02 Purpose and Need.** The purpose of the 933 project is to utilize beach quality sand dredged from the adjacent Federal navigation channels and from Brandt Island in order to stabilize eroding beaches on Bogue Banks.

## **2.00 DESCRIPTION OF THE PROPOSED ACTION AND AUTHORIZATION.**

Historically, dredged material has been considered a waste material. Prior to the National Environmental Policy Act (NEPA) of 1969 and the Federal Water Pollution Control Act of 1972, its treatment often consisted of unconfined disposal into waters and wetlands adjacent to navigation channels. More recently, it has been deposited within diked disposal islands or transported to an ODMDS located offshore. However, dredged material is now recognized as a valuable resource that can be beneficially used in various ways depending upon its physical and chemical characteristics and its location. Sand is especially valuable for beach replenishment. Consequently, it is no longer an acceptable practice to remove sand from the active littoral system by ocean disposal when other cost-efficient and environmentally acceptable options are available. The North Carolina Coastal Management Program now requires that clean, beach-quality sand dredged from navigation channels in the coastal area not be removed permanently from the active nearshore, beach, or inlet shoal system, unless no practicable alternative exists (NC Administrative Code T15A: 07M.1102). This policy is not without controversy since intertidal macroinvertebrate populations, shorebirds, and nesting sea turtles utilize beach habitat and can be subject to adverse impacts from placement of dredged material during warmer months of the year.

Beach-quality sand dredged during maintenance of Morehead City Harbor and the pumpout of Brandt Island will be made available for placement on area beaches, to the extent feasible. Planning for the placement of this sand is being coordinated through Carteret County, the towns of Atlantic Beach, Pine Knoll Shores and Indian Beach (including Salter Path), and Fort Macon State Park. These communities have expressed interest in acquiring as much sand as possible from the proposed action and are currently working with Federal and State governments to obtain funding assistance for sand placement, through the authority of Section 933 of the Water Resources Development Act of 1986, as amended.

Placement of sand on the Bogue Banks beaches under Section 933 is designed to begin at the toe of the existing dune (elevation + 7.0 ft NGVD) and extend to the mean high water mark seaward by means of a low berm (Figure 6 of the main report).

As a result of discussions and a June 24, 2003 meeting with the State and Federal agencies, the proposed Section 933 project has been modified. We still propose to place up to 6.3 million cubic yards of material dredged from the pumpout of Brandt Island and the maintenance dredging of Morehead City Harbor onto Bogue Banks, from Fort Macon State Park to Indian Beach (including Salter Path), a distance of about 13 miles. However, the time required to complete this proposed Section 933 project has been reduced, from up to 16 months to about 6 months (start the pipeline

dredging on November 1, 2003 and may be completed by April 30, 2004). The contract solicitation will indicate this November 1, 2003 to April 30, 2004 period. However, if the contractor experiences mechanical problems with the pipeline dredge or booster pumps, we may have to extend the contract past April 30, 2004. This means that if the contractor experiences 13 days down time (from November 1, 2003 to April 30, 2004), he would be given 13 days in May to recover the down time. Under no circumstance, would the contractor be given an unequal amount of time (i.e., down 13 days and given 31 days to recover in May).

All pumping of material to the beach will be completed no later than May 31, 2004. Placement and removal of equipment (pipe, booster pumps, etc.) may be staged on the beach several weeks before November 1, 2003 and removed from the beach after May 31, 2004. If we have to work on the beach strand after May 1, 2004, we will initiate sea turtle monitoring and relocate any nests within the project area (as well as abide by the environmental commitments 1 and 2 found in Section 9.0 of the FONSI). Under no circumstances would we place material on Bogue Banks past the May 31, 2004 deadline. The hopper dredging would not change (start January 1, 2004 and be completed by March 31, 2004).

Carteret County has agreed to continue monitoring the Phase 1 area (Pine Knoll Shores to Indian Beach (including Salter Path)) beyond November 2003, if adequate recovery of mole crabs and coquina clams does not occur. If required the monitoring would be extended to November 2004. Please note if the Section 933 project is not funded, Carteret County **will not** extend the monitoring until November 2004.

Basically, two components of the project's economics would be affected by reducing construction time from 16 months as assumed in the report to 6 months; they are Benefits During Construction (BDC) and Interest During Construction (IDC). The IDC, which is not an annual cost but a contributing line item to first cost that is later annualized, goes from \$708,000 to \$309,000. The impact of this change on the cost side and the BCR is negligible. Reducing the construction period by 10 months has a much larger effect on BDC, which is computed as an annual benefit. BDC would go from \$574,000 shown in the report to about \$217,000. The net effect of this \$357,000 decrease in the total expected annual benefits in the report, \$10,655,000, yields a slight decrease in the BCR from 4.9 to 4.7. The economics of the project remain very robust.

Should present plans for sharing sand by Bogue Banks beaches not materialize due to funding problems or other unforeseen reasons, dredged maintenance material from the inner and the outer harbor, as well as the pump out of Brandt Island would be distributed according to the base disposal plan. The base disposal plan represents the least cost alternative for the government, which is engineeringly feasible and environmentally acceptable.

Under this base disposal plan, the outer harbor would be maintained by hopper dredge and the resultant excavated material (up to 1.5 million cubic yards) would be placed in the previously approved nearshore area, or in the ODMDS if sea conditions were too rough nearshore. The pumpout of Brandt Island and the maintenance dredging of inner harbor by pipeline dredge would be placed from Fort Macon State Park to Atlantic Beach. Up to 4.8 million cubic yards (i.e., approximately 4.0 million from Brandt Island and about 0.8 million from the inner harbor) of beach quality sand may be placed along 32,000 feet of shoreline from Fort Macon State Park to Atlantic Beach.

Under either the 933 or base plan, the beachfill impacts are measured as the distance from the existing dune tie-in at +7 feet NGVD to Mean High Water (+2.21 feet NGVD). After a period of sorting, the beachfill slope will flatten as indicated in Figure 6 of the main report. Because of the sorting process, the proposed construction berm width will be 2 to 3 times as wide as the design berm widths indicated in Table 1-1 (found in the EA). The 933 design berm widths and the base berm widths would remain unchanged, however, if dredge material quantities are reduced the placement of dredge material may be shortened.

The hopper dredge(s) would start maintaining the Morehead City outer harbor channels and pump the material ashore to Indian Beach and/or Pine Knoll Shores. The hopper dredge(s) would work only from 1 January to 31 March of any year, when turtles are not likely to be present.

The proposed project is being undertaken under the authority of Section 933 of the Water Resources Development Act of 1986 (Public Law 99-662), as amended. Section 933 authorizes 65 percent federal and 35 percent non-federal sharing of the extra costs of depositing dredged material from federal navigation improvements and maintenance on beaches. Sand placed through the use of this authority must provide benefits at least equal to the cost of placement, but future nourishment of the beach is not a project requirement; i.e., the beach does not become a federal shore protection project with a continuing maintenance obligation.

### **3.00 INCORPORATION BY REFERENCE**

U. S. Army Corps of Engineers, Wilmington District. Draft Evaluation Report and Environmental Assessment, Morehead City Harbor, Section 933, Carteret County, North Carolina. May 2003.

#### **4.00 PUBLIC AND AGENCY COORDINATION**

On May 2, 2003, the Draft Evaluation Report and Environmental Assessment (EA) referenced previously, was mailed to Federal and State agencies and the interested public for a 30-day review and comment period. The list of recipients is provided in the above-referenced EA.

On July 10, 2003, the Draft Unsigned Finding of No Significant Impact (FONSI) was e-mailed to those individuals and agencies, which commented on the EA for a 7-day review and comment period.

#### **5.00 COMMENTS RECEIVED AND RESPONSES**

Comments were received from the following:

- 5.01 U.S. Environmental Protection Agency (USEPA)
- 5.02 U.S. Department of Agriculture,  
Natural Resources Conservation Service (NRCS)
- 5.03 U.S. Department of Health and Human Services,  
Centers for Disease Control & Prevention (CDC)
- 5.04 U.S. National Marine Fisheries Service (NMFS), Endangered Species
- 5.05 U.S. National Marine Fisheries Service (NMFS), EFH Comments
- 5.06 U.S. Department of the Interior, Fish and Wildlife Service (USFWS),  
Endangered Species
- 5.07 U.S. Department of the Interior, Fish and Wildlife Service (USFWS),  
NEPA Review on the EA
- 5.08 North Carolina Department of Administration
- 5.09 North Carolina Department of Environment and Natural Resources  
(NCDNR)
- 5.10 -Division of Marine Fisheries, memo from Preston P. Pate, Director
- 5.11 -Division of Marine Fisheries, e-mail from Mike Street to Melba  
McGee
- 5.12 -Division of Marine Fisheries, memo from Mike Marshall to Melba  
McGee
- 5.13 -Division of Coastal Management, memo from Ted Tyndall to Guy  
Pearce
- 5.14 North Carolina Wildlife Resources Commission
- 5.15 Shellfish Sanitation and Recreational Water Quality Section
- 5.16 NC Division of Coastal Management, memo to Melba McGee from  
Guy Pearce
- 5.17 Checklist from Wilmington Regional Office, NCDENR  
Public Letters Addressed to Ms. Chrys Baggett, State Clearinghouse,  
NC Department of Administration
- 5.18 Dr. Charles H. Peterson, UNC Chapel Hill, Environmental Defense  
(identical letter addressed to the Corps, mentioned below 5.20)



- 5.19 Bogue Banks Environmental Stewardship Corporation
- 5.20 Environmental Defense
- 5.21 North Carolina Coastal Federation (NCCF)
- 5.22 Dr. Andrew Coburn, Duke University
- 5.23 Dr. Douglas J. Wakeman, Meredith College
- 5.24 Mr. T. B. Doe III

All comments received on the EA were considered in making the decision to sign the FONSI. Pertinent comments from each reviewer are summarized and addressed below. Copies of the letters received are included in Appendix 2. In many instances, our response to a comment is indicated as "noted". Noted, means that the comment was evaluated and was considered before making the decision to sign the FONSI.

In order to reduce repetition, responses are made once to a comment and a particular issue. If the issue appears again, in another letter or in the same letter, the reader is referred to the initial comment. Detailed responses are not given to comments, which repeat information found in the Draft Evaluation Report.

As indicated in Section 4.0 of the FONSI, on July 10, 2003 we e-mailed copies of the Draft Unsigned FONSI to those agencies and individuals commenting on the EA dated May 2, 2003 for a 7-day review. No formal responses will be made on these new comments, but we have made revisions as appropriate to the FONSI.

#### **5.01 USEPA; letter dated May 13, 2003.**

**Comment 1:** Pursuant to Section 309 of the Clean Air Act, EPA, Region 4 has reviewed the subject document, an evaluation of the environmental consequences of placing dredged material from the Morehead City Harbor and the Brandt Island Upland Diked Disposal Area onto the Bogue Banks Beaches, viz., Atlantic Beach, Pine Knoll Shores, and Indian Beach. The subject beaches (13 miles in extent) will receive up to 6.3 million cubic yards of material from the two noted project sites. A berm system 30-feet wide at +7 NGVD will be constructed on a 1:25 slope in this one-time operation.

**Response:** Noted.

**Comment 2:** EPA has previously commented to the District on the overall advisability of pumping sand onto an eroding shore face. Generally, we have not had significant concerns about beach nourishment when it provides a disposal site for a proximate, already authorized navigation project. However, the more operative factor was whether or not biologically sensitive resources would be adversely affected through the use of this disposal option. In this particular case the value of the impacted natural resources which will be inundated do not appear compelling and/or at long-term risk. On the other hand, the declining width of the recreational beach, the storm protection potential afforded adjacent shore front property owners, and the acceptable expense of this disposal option appear to counter balance any unavoidable effects accruing from this proposal.

**Response:** Noted.

**Comment 3:** As a result, we have no substantive objections with the FONSI determination that an environmental impact statement is not necessary to evaluate the project. Thank you for the opportunity to comment. If we can be of further assistance, Dr. Gerald Miller (404-562-9626) will serve as initial point of contact.

**Response:** Noted.

**5.02 NRCS; letter dated May 15, 2003.**

**Comment:** The NRCS does not have any comments at this time.

**Response:** Noted.

**5.03 CDC, letter dated May 19, 2003.**

**Comment 1:** We appreciate the opportunity to review the Draft Evaluation Report and Environmental Assessment (EA) for Morehead City Harbor, Section 933, Carteret County, North Carolina. We are responding on behalf of the U.S. Public Health Service, Department of Health and Human Services (DHHS).

**Response:** Noted.

**Comment 2:** This project will have beneficial effects when completed and we are in overall agreement with its implementation. We believe this EA has adequately addressed the potential human health and safety concerns with one exception. Although we agree with the Corps that the probability of contamination may be low, we still believe that Morehead City inner harbor sediments should be sampled prior to dredging. The cost of running a few samples to verify that there are no human health concerns from potentially contaminated sediments is minimal in relation to the estimated overall project cost of \$16,354,000. We also noted that in response to your January 15, 2002 scoping letter, that the public and other review agencies had also raised a similar concern.

**Response:** As indicated in Section 6.12 of the EA, "The USACE standard tiered approach for analyzing the potential for encountering contaminated sediments in the navigational channels and Brandt Island were used to assess these areas for HTW. According to this analysis, before any chemical or physical testing of sediments is conducted, **a reason to believe that the sediments may be contaminated must be established (emphasis added by the writer)**. The sources of the sediments in the selected areas (i.e., Brandt Island and the existing navigation channels) are generally sand derived from sediment transport and deposition by ocean currents that are not conducive to settling of contaminants. The probability of the sites being contaminated by pollutants is also low since the sediment in existing navigational channels and placement areas have not been used as an industrial site, dump, or contaminant disposal area." As indicated in Section 4.02 of the EA, the waters in the vicinity of the Morehead City Harbor inner harbor channels have been classified as prohibited shellfish areas by the NC Shellfish Sanitation and Recreational Water Quality Section. If maintenance material is excavated from these closed shellfishing areas (i.e., Morehead City Harbor inner harbor channels)

between May 1 and October 31 and placed on Bogue Banks, NC Shellfish Sanitation and Recreational Water Quality Section has requested us to post a swimming advisory and a press release will be made. Additionally, the Wilmington District will notify the Shellfish Sanitation and Recreational Water Quality Section prior to dredging from a closed shellfishing area with placement on a recreational swimming area (see Section 6.14 of the EA).

**Comment 3:** Thank you for the opportunity to review and comment on this document. Please send us a copy of the final document when it becomes available.

**Response:** We will provide you with a copy of the final document.

**5.04 NMFS, letter dated June 13, 2003, regarding the formal Section 7 consultation under the Endangered Species Act of 1973, as amended.**

**Comment 1:** This correspondence is in reply to the May 2, 2003, letter and accompanying information from the U.S. Army Corps of Engineers (COE), Wilmington District. The COE has requested section 7 consultation from the National Marine Fisheries Service (NOAA Fisheries), pursuant to the Endangered Species Act of 1973 (ESA). The project is the placement of beach quality material from the pumpout of Brandt Island and the maintenance dredging of Morehead City Harbor navigation channels on Bogue Banks. The NOAA Fisheries' consultation number for this project is I/SER/2003/00567; please refer to this number in future correspondence on this project. The COE is proposing to use the beach quality sand collected from the maintenance dredging of Morehead City Harbor and the pumpout of the Brandt Island Upland Diked Disposal Area for beach renourishment on Bogue Banks. The proposed Section 933 (Water Resources Development Act of 1986) project would place this sand along about 70,000 feet (13 miles) of beach from Fort Macon State Park to Indian Beach if the requirements of Section 933 are satisfied. If Section 933 requirements are not satisfied placement will occur only along the base disposal plan area (Fort Macon State Park to Atlantic Beach, a distance of about 6 miles).

**Response:** Agree.

**Comment 2:** ESA-listed species under the purview of NOAA Fisheries which potentially occur in the project area include the *green* (*Chelonia mydas*), loggerhead (*Caretta caretta*), Kemp's ridley (*Lepidochelys kempii*), leatherback (*Dermochelys coriacea*), and hawksbill (*Eretmochelys imbricata*) sea turtles, and the shortnose sturgeon (*Acipenser brevirostris*). A number of endangered large whale species are known to occur off North Carolina, but are not expected to occur in the project area. No critical habitat has been designated or proposed for listed species within the project area.

**Response:** Agree.

**Comment 3:** The maintenance dredging of the inner harbor and the pumpout of Brandt Island would be performed with a pipeline dredge, while the outer harbor maintenance dredging would be done by a hopper dredge. Pipeline dredging is not known to take sea turtles. When the hopper dredge is used, the project would be authorized under the regional biological opinion (RBO) on hopper dredging by NOAA Fisheries (September 25, 1997, biological opinion to U.S. Army Corps of Engineers, South Atlantic Division, on the continued

hopper dredging of channels and borrow areas in the southeastern United States). All terms and conditions included in the RBO will be adhered to by the COE (e.g., observer and reporting requirements, dredging windows), which was reiterated by Mr. Hugh Heine in a May 20, 2003, phone call to NOAA Fisheries. Any incidental take of sea turtles resulting from the operation of hopper dredges by the COE's South Atlantic Division is authorized under the Incidental Take Statement (ITS) of that biological opinion, and such take would be counted toward the total allowable take in that ITS. Year to date, 6 loggerheads have been taken under the ITS for the South Atlantic coast hopper dredging RBO. The total take limit for the year is 35 loggerhead, 7 green, 7 Kemp's ridley, and 2 hawksbill sea turtles, as well as 5 shortnose sturgeon.

**Response:** We will abide by the terms and conditions found within the NMFS regional biological opinion (RBO). The 1997 NMFS RBO has no hopper dredging window, however the Corps of Engineer, South Atlantic Division (SAD) and the Wilmington District Protocols indicate that for Morehead City Harbor, hopper dredging can only be conducted from 1 January to March 31 of any year. We will comply with the SAD and Wilmington District Protocols.

**Comment 4:** As stated above, pipeline dredging is not known to take sea turtles, and hopper dredging would be covered under the hopper dredging RBO. The placement of dredged material onto the Bogue Bank beaches would not have a direct impact on sea turtles in water, and would not have a substantial impact on sea turtle foraging habitat. Nesting-related impacts from beach renourishment fall under the purview of the U.S. Fish and Wildlife Service, which must be consulted regarding this aspect of the project. Turbidity resulting from the dredging and the spoil placement would be temporary and minimal. Shortnose sturgeon are not known to occur in the project area. NOAA Fisheries, therefore, believes that the proposed action is not likely to adversely affect any listed species under our purview.

**Response:** Agree.

**Comment 5:** This letter concludes the COE's consultation responsibilities under section 7 of the ESA. for the proposed actions for federally-listed species, and their critical habitat, under NOAA Fisheries' purview. A new consultation should be initiated if there is a take, new information reveals impacts of the proposed actions that may affect listed species or their critical habitat, a new species is listed, the identified action is subsequently modified, or critical habitat is designated that may be affected by the proposed activity.

**Response:** If any of these conditions are met, we will reconsult with NMFS.

**Comment 6:** The action agency is also reminded that, in addition to its protected species/critical habitat consultation requirements with NOAA Fisheries' Protected Resources Division pursuant to section 7 of the ESA, prior to proceeding with the proposed action the action agency must also consult with NOAA Fisheries' Habitat Conservation Division (HCD) pursuant to the Magnuson-Stevens Fishery Conservation and Management Act's requirements for essential fish habitat (EFH) consultation (16 U.S.C. 1855 (b)(2) and 50 CFR 600.905-.930, subpart K). The action agency should also ensure that the applicant understands the ESA and EFH processes; that ESA and EFH consultations are separate, distinct, and guided by different statutes, goals, and time lines for responding to the action agency; and that the action agency will (and the applicant may) receive separate consultation correspondence on NOAA Fisheries letterhead from HCD regarding their concerns and/or

finalizing EFH consultation. Consultation is not complete until EFH and ESA concerns have been addressed.

**Response:** See responses to NMFS letter (5.05) dated June 5, 2003, regarding EFH below.

**Comment 7:** If you have any questions about EFH consultation for this project, please contact Mr. Ron Sechler, HCD, at (252) 728-5090. If you have any questions about this ESA, consultation, please contact Dennis Klemm, fishery biologist, at the number above or by e-mail at [Dennis.Klemm@noaa.gov](mailto:Dennis.Klemm@noaa.gov).

**Response:** Thank you for your comments.

#### **5.05 NMFS, letter dated June 5, 2003, regarding the EFH review of the EA.**

**Comment 1:** The National Marine Fisheries Service (NOAA Fisheries) has reviewed Public Notice CESA-W-TS-PE-03-16-002 (Notice of Availability) and the Draft Environmental Assessment (EA) and Evaluation Report, dated May 2, 2003, for proposed work on Bogue Banks in Carteret County, North Carolina. The U.S. Army Corps of Engineers (COE) proposes to place dredged material from maintenance of the inner and outer harbor navigation channels, and stored at the Brandt Island upland disposal site, on oceanfront beaches of Fort Macon, Atlantic Beach, Pine Knoll Shores, and Indian Beach. Disposal of 1.8 million cubic yards of material is currently authorized for periodic placement along 6 miles of beach at Fort Macon and Atlantic Beach. The proposed Section 933 beneficial use of dredged materials project would extend this disposal area an additional 7.2 miles and authorize placement of 4.5 million cubic yards of material on beaches at Pine Knoll Shores and Indian Beach, which includes Salter Path. A total of approximately 6.3 million cubic yards of material would be placed along a total of 13.2 miles of oceanfront beach on Bogue Banks. A hydraulic pipeline dredge would be used to construct the project and work would begin on November 16, 2003, and continue through April 30, 2005, a total of 16 months.

**Response:** As indicated in Section 2.0 of the FONSI, we have modified the proposed Section 933 project. As a result of discussions and a June 24, 2003 meeting with the State and Federal agencies, the proposed Section 933 project has been modified. We still propose to place up to 6.3 million cubic yards of material dredged from the pumpout of Brandt Island and the maintenance dredging of Morehead City Harbor onto Bogue Banks, from Fort Macon State Park to Indian Beach (including Salter Path), a distance of about 13 miles. However, the time required to complete this proposed Section 933 project has been reduced, from up to 16 months to about 6 months (start the pipeline dredging on November 1, 2003 and may be completed by April 30, 2004). The contract solicitation will indicate this November 1, 2003 to April 30, 2004 period. However, if the contractor experiences mechanical problems with the pipeline dredge or booster pumps, we may have to extend the contract past April 30, 2004. All pumping of material to the beach will be completed no later than May 31, 2004. Placement and removal of equipment (pipe, booster pumps, etc.) may be staged on the beach several weeks before November 1, 2003 and removed from the beach after May 31, 2004. If we have to work on the beach strand after May 1, 2004, we will initiate sea turtle monitoring and relocate any nests within the project area (as well as abide by the environmental commitments 1 and 2 found in Section 9.0 of the FONSI).

Under no circumstances would we place material on Bogue Banks past the May 31, 2004 deadline. The hopper dredging would not change (start January 1, 2004 and be completed by March 31, 2004).

**Comment 2:** NOAA Fisheries understands that the project would allow the beneficial use of dredged material and that other beach re-nourishment activities would not be authorized under this authority. We are concerned, however, that adverse impacts to fishery resources for which we have stewardship responsibility, may result. The project would involve disposal of dredged material in marine intertidal and ocean surf zone areas that are designated as Essential Fish Habitat (EFH) for Federally managed species. We note that an EFH Assessment is provided on Pages 36-40 in the EA and, by letter dated May 2, 2003, from the COE, NOAA Fisheries was notified that via transmittal of the EA, the Wilmington District was initiating coordination procedures for EFH as required by the 1996 amendments to the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA)(PL 94-265).

**Response:** Noted.

**Comment 3:** Based on our review of the EFH assessment, we find that EFH and associated managed species found in the project area are adequately described. However, we do not agree with the determination that project related impacts to Federally managed species would be minimal when viewed in connection with other similar and authorized projects in this area. The project would be located in an area identified by the South Atlantic Fishery Management Council (SAFMC) as EFH for red drum, brown shrimp, pink shrimp, and white shrimp. In addition, EFH for king mackerel and Spanish mackerel, is located just offshore of the immediate project area. Categories of EFH for various life history stages of these species include the marine water and ocean surf zone. In addition, tidal inlets such as Beaufort and Bogue inlets, located on the eastern and westernmost ends of the project area, respectively, are designated as Habitat Areas of Particular Concern (HAPC) for shrimp and red drum. EFH for summer flounder and bluefish, which are under jurisdiction of the Mid-Atlantic Fishery Management Council (MAFMC) also occur in the project area. Categories of EFH for these species include marine water column, intertidal areas, and marine bottoms. Other species of commercial, recreational, and ecological importance found in the project area include Atlantic croaker, spot, Atlantic menhaden, striped mullet, and Florida pompano. These species serve as prey for species such as king mackerel, Spanish mackerel, cobia, and others that are managed by the SAFMC, and for highly migratory species (e.g., billfishes and sharks) that are managed by NOAA Fisheries. In addition, pursuant to Section 906(e)(1) of the water Resources Development Act of 1986 (PL 99-602) NOAA Fisheries regards fishery resources impacted by this project and their associated habitats as aquatic resources of "national economic importance".

**Response:** The USACE desires to protect the fish and shellfish resources of the project area. Section 5.05, Essential Fish Habitat of the EA discusses the impacts of the project on Hardbottoms, State-designated Areas of Importance for Managed Species, Marine Water Column, Cape Lookout Sandy Shoals, Mud Bottoms, Larval Entrainment and Other Habitat Areas of Particular Concern. We summarize the EFH section by indicating, that "the proposed action is not expected to cause any significant impacts to Essential Fish Habitat of EFH species. Impacts are expected to be minor on an individual and cumulative

effects basis.” Since we have modified the project description (see response to Comment 1, above), we believe that the proposed action will not cause any significant impacts to Essential Fish Habitat of EFH species.

**Comment 4:** NOAA Fisheries is concerned that the EA does not adequately consider cumulative impacts to fishery resources that may result from multiple beach nourishment projects on Bogue Banks. The communities of Pine Knoll Shores, Indian Beach and Emerald Isle are currently authorized, via the three phased Bogue Bank Beach Nourishment Project (BBBNP), to place sand along 16.8-miles of beach on Bogue Banks. Beaches at Pine Knoll Shores and Indian Beach were recently impacted by a project that is similar to that being proposed, and similar work is planned for Emerald Isle in 2004. Environmental monitoring of these privately constructed projects indicate that populations of macro-invertebrates and several fish species that inhabit the surf zone of these beaches have not fully recovered. Construction of the proposed Section 933 project, as scheduled, would eliminate any recovery of these species, which has taken place at Pine Knoll Shores and Indian Beach. Populations of mole crabs (*Emerita talpoida*) and coquina clams (*Donax variabilis*), which normally occur in the ocean surf zone EFH, are important components of the aquatic food chain that supports regionally and nationally significant fishery resources. Elimination of these important food sources twice within a three-year period could result in significant ecological impacts due to loss of forage organisms for other species; however, we acknowledge that detection of such impacts would be difficult.

**Response:** See response to EFH Recommendations 4 (Comment 12), below.

**Comment 5:** Based on the preceding, NOAA Fisheries does not support the determination, as stated in the EA, that continuous dredging and disposal of dredged material on Bogue Banks for 16 months would only minimally impact fishery resources including Federally managed species. Work associated with the BBBNP was restricted to winter months (November 16 to the end of March or April of any year) and the COE Regulatory Division agreed that a seasonal restriction on dredging and disposal of dredged material on the beachfront was appropriate for protection of fishery resources. Consequently, NOAA Fisheries believes the same seasonal work restriction is needed in connection with the proposed Section 933 project.

**Response:** See response to EFH Recommendations 2 (Comment 10), below.

**Comment 6:** In connection with the preceding, we further note that Phase I of the BBBNP was constructed between December 2001, and April 2002, and Phase II was constructed between January and March of 2003. Maintenance dredging of navigation channels in and around Morehead City harbor resulted in placement of another 200,000+ cubic yards of material on the Fort Macon shoreline in 2002. The proposed Section 933 project would place up to 6.3 million cubic yards of material on Bogue Banks in 2003, 2004 and, 2005, and Phase III of the BBBNP would immediately follow in the winter of 2004 - 2005. During this four-year period, surf zone EFH would be repeatedly impacted and recovery of the macro-invertebrate forage base that supports Federally managed fishes could be negligible over a wide area of Bogue Banks.

**Response:** See response to EFH Recommendations 1 (Comment 9) and EFH Recommendations #4 (Comment 12), below.

**Comment 7:** The EA also provides no convincing evidence that the project would significantly reduce shoreline erosion and storm damage. The analyses of storm related erosion and damage, both with and without the project, does not adequately consider existing conditions created by Phases I and II of the BBBNP which has widened the beaches at Pine Knoll Shores and Indian Beach. This change has reduced the vulnerability of these locations to storm damage and the EA should be revised to include existing conditions in the "without the project" alternative analysis. Reevaluation of the "without the project" alternative to include the BBBNP could preclude the need for the proposed Section 933 project. In any case, NOAA Fisheries does not believe that the Section 933 project is the least environmentally damaging practical alternative since the cumulative impact to fishery resources over a relatively short period of time may be substantial and is undetermined.

**Response:** See response to EFH Recommendations 1 (Comment 9), below.

**Comment 8:** The compatibility of sediments between those found at the Brandt island disposal site and those on Bogue Banks beaches is not adequately addressed in the EA. The 6.3 million cubic yards of material located at Brandt Island have not been tested for characteristics known to be of ecological importance (e.g., grain size/percent fines and carbonate/shell content ). The EA assumes that this material is representative of the material historically found in the navigation channels and concludes that no further analysis is warranted. NOAA Fisheries is concerned that sediments removed from the navigation channels may contain significantly different percentages of shell, silt, and clay than those found Bogue Banks beaches. This is important since significant differences in sediment compositions could adversely affect the recovery of surf zone fish and invertebrate species. Based on (1) previous observations which revealed material previously pumped from Brandt Island to Fort Macon was darker and contained large amounts of shell; (2) previously stated concerns regarding the sediment compatibility at Bogue Banks; and (3) the absence of site specific sediment analysis for the Brandt Island material, we find no convincing basis for assertion, as contained in the EA, that the material is compatible and can be used without ecological or environmental impacts. Therefore, NOAA Fisheries recommends completion of a comprehensive evaluation of sediment size and composition prior to implementation of the proposed Section 933 project.

**Response:** See response to EFH Recommendations 3 (Comment 11), below.

**Comment 9:** In view of the preceding, NOAA Fisheries recommends against construction of the project unless the following conditions are incorporated into the project plan.

#### EFH Conservation Recommendations

1. The "without the project" conditions in the EA should be modified to include shoreline changes associated with the BBBNP. The BBBNP represents a significant change in the "without the project" conditions and these changes should be considered in the overall analyses of the need and timing of the proposed action.

**Response:** Appendix C of the Draft Evaluation Report and Environmental Assessment, Morehead City Harbor Section 933, Carteret County, North Carolina, dated May 2, 2003 contains the 30 page Coastal Analysis, which describes how the proposed



project was developed. The Coastal Analysis Appendix discusses the existing conditions, beach profile characteristics, shoreline change rates, coastal processes, storm surge modeling, etc. On page C-23, within the "Beachfill Evolution" section we state "Beachfill or beach disposal planform evolution was evaluated for both recent local nourishment activities and potential study alternatives." On page C-24, within the "Beachfill Evolution" section we also describe the local nourishment project and study alternatives. Additionally, section 1.02 of the EA describes the BBBNP and is included in the Corps Cumulative Impact Analysis found in Attachment E of the EA.

As indicated in Section 1.02 of the EA and the Coastal Analysis Appendix found in the Draft Evaluation Report (page Appendix C-24), "phase 1 of the local nourishment project resulted in the placement of approximately 1.73 million cubic yards of material on Pine Knoll Shores to Indian Beach, a distance of 39,202 feet. The berm-only project averaged less than 45 cubic yards per foot, which is a very small beachfill." Table 1-1 in the EA provides maximum quantities (cubic yards per foot) for both the Section 933 and the base disposal plan. The average maximum sediment disposal rate (cubic yard per foot) is 88 for Fort Macon, 49 for Atlantic Beach, 124 for Pine Knoll Shores, and 105 for Indian Beach (including Salter Path). The local nourishment project did not preclude the urgency to conduct the proposed Section 933 project (see Coastal Analysis Appendix found in the Draft Evaluation Report). Therefore, the BBBNP was considered in the overall analysis of the need and timing of the proposed action.

**Comment 10:** EFH Recommendations 2. In order to avoid and minimize adverse impacts to surf zone EFH and associated fishery resources during peak periods of biological activity, project construction should be limited to the period between November 16 and March 1 of any year.

**Response:** As indicated in Section 2.0 of the FONSI and in response to comment 1, above, we have agreed to limit beach disposal from November 1, 2003 to April 30, 2004 (or no later than May 31, 2004, if the contractor experiences equipment problems). By constructing the proposed Section 933 project within the revised window, we believe that the work will avoid and minimize impacts to EFH and associated fishery resources.

**Comment 11:** EFH Recommendations 3. Prior to the placement of fill material on Bogue Banks, it should be evaluated and found to be compatible and suitable with regard to fishery habitat and other ecological and environmental factors.

**Response:** We agree. As you are aware, the majority of dredge material from the Morehead City Harbor inner channels are pumped to Brandt Island. In March 2003, we sampled the inner harbor channels and have completed the compatibility analysis on the material of the inner channels and compared that to the existing beach at Fort Macon, Atlantic Beach, Pine Knoll Shores, and Indian Beach (see Table 1, below). These results indicate that the dredge material from Brandt Island and the Morehead City Harbor inner channels are compatible with native materials found on Bogue Banks.

**Table 1**  
**Bogue Banks**  
**Compatibility Analysis Results**

**Borrow Area**

	<u>Samples</u>	<u>% Silt</u>	<u>% Shell</u>	<u>Mean</u>	<u>Standard Deviation</u>
Morehead City Inner Harbor	12	1.6	5.4	2.24	.43

**Native Beach**

	<u>Samples</u>	<u>% Silt</u>	<u>% Shell</u>	<u>Mean</u>	<u>Standard Deviation</u>	<u>Overfill Ratio</u>
Fort Macon	43	1.6	10.9	2.23	.80	1.11
Atlantic Beach	82	3.4	8.8	2.45	.79	1.28
Pine Knoll Shores	105	3.6	8.9	2.41	.81	1.46
Indian Beach	36	3.2	10.9	2.28	.93	1.20
East Emerald Isle	51	2.6	6.3	2.30	.74	1.63
West Emerald Isle	68	2.4	4.9	2.37	.68	1.20
Bogue Inlet Area	51	1.9	4.0	2.40	.52	1.02

**NOTE:** Mean and Standard Deviation are expressed in terms of  $\phi$ .

**Comment 12:** EFH Recommendations 4. To avoid and minimize cumulative adverse impacts, scheduling of the project should be revised so that any section of beach nourished in connection with the BBBNP after December 2001, should allow for a minimum three-year recovery period for fish and macro-invertebrate populations.

**Response:** As indicated in our response to EFH Recommendations #3, above, the material placed on Bogue Banks from Brandt Island is compatible. Literature dating back to the early 1970's along the southeast coast indicate that opportunistic infauna species (ex. *Emerita* and polychaetes) found in the nourished areas are subject to direct mortality from burial, however, recovery often occurs between 1 to 3 years depending on sediment compatibility and the relationship of nourishment placement to recruitment timeframes (Hayden and Dolan, 1974; Saloman, 1984; Nelson, 1989; Van Dolah et al., 1992; Van Dolah et al., 1993; Hackney et al. 1996; P.C. Jutte et al., 1999). Therefore, a minimum three-year recovery period is not required.

**Comment 13:** EFH Recommendations 5. Avoidance and minimization of adverse impacts is always preferable to restoration after impacts occur; however, since placement of incompatible sediments on the ocean beachfront and surf zone is a reoccurring concern, the COE should develop a beach nourishment reclamation plan to address this possibility. The plan could include measures such as removal of incompatible material and replacement with compatible material and/or an increase in monitoring the magnitude and longevity of ecological impacts.

**Response:** As indicated in our response to NMFS Comment 11, EFH Recommendation 3, above the material from Brandt Island is compatible. The proposed Section 933 action is a civil works project and therefore Corps' inspectors will be assigned to monitor the hydraulic dredge, pipeline route, booster pumps (if required), and placement sites on the beach. These inspectors review the ongoing work for safety, as well as making sure that the contractor complies with all conditions (found in the plans and specifications) of the contract. We will include the following paragraph in the proposed Section 933 specifications, "*Materials: The dredging shall be accomplished so that the most suitable material available for beach disposal is placed within the prescribed section. Suitable materials shall be comprised of materials by ASTM D 2487 as SP, SP-SM, and SW. This material shall be predominantly of sand grain size with no more than 10% silt, shell, and clay material present. Should the dredge encounter materials not suitable for placement on the beach, the Contractor will be directed by the Contracting Officer to move to a more satisfactory location within Brandt Island or the navigation channels.*" If problems occur during construction anywhere along the pipeline route or if the contractor is not abiding by the conditions of the contract (i.e., pumping material to the beach that is not suitable), these Corps inspectors would immediately notify the Contracting Officer (CO) located at the District office and the CO would direct the contractor to move the dredge to a more suitable site in Brandt island or the navigation channels.

**Comment 14:** NOAA Fisheries is unable to concur with a Finding of No Significant Impact for this project and preparation of an Environmental Impact Statement (EIS) is recommended. An adequate EIS would provide for a comprehensive assessment of the site specific and cumulative impacts of Bogue Banks Section 933 project and other related activities and projects on Bogue Banks. Furthermore, the potential for significant and adverse long-term impacts to nationally important living marine resources is such that NOAA Fisheries may elect to recommend that the project not be implemented and,

depending on the content and conclusions reached in the Final EA or EIS, refer this project to the Council on Environmental Quality under Section 1504 of the Council's Regulations for implementing the Procedural Provisions of the National Environmental Policy Act.

**Response:** In summary, we have reviewed all the comments received on the EA. Based upon our review of these comments and investigations required to respond to NMFS and the other comments, we believe that the EA/FONSI is an appropriate document for the proposed action and it fully complies with NEPA. We believe that the proposed action will not adversely impact "the nationally important living marine resources" for the following reasons: 1. The dredge material found within Brandt Island and the Morehead City Harbor channels is compatible (see response to Comment 11: EFH Recommendations 3 within the NMFS letter 5.05, dated June 5, 2003), 2. Requirements for Section 7 of the Endangered Species Act of 1973, as amended have been met. The project is covered under a USFWS Biological Opinion dated July 22, 2003 and a NMFS Regional Biological Opinion dated 1997. All reasonable and prudent measures, as well as all terms and conditions of the USFWS Biological Opinion dated July 22, 2003 (see Appendix 2) and the NMFS Regional Biological Opinion dated 1997 (see letter dated June 13, 2003 from NMFS found in Appendix 2) will be complied with, 3. Literature dating back to the early 1970's along the southeast coast indicate that opportunistic infauna species (ex. *Emerita* and polychaetes) found in the nourished areas are subject to direct mortality from burial, however, recovery often occurs between 1 to 3 years depending on sediment compatibility and the relationship of nourishment placement to recruitment timeframes (Hayden and Dolan, 1974; Saloman, 1984; Nelson, 1989; Van Dolah et al., 1992; Van Dolah et al., 1993; Hackney et al. 1996; P.C. Jutte et al., 1999). Therefore, a minimum three-year recovery period is not required, 4. The revised construction window is from November 1, 2003 to April 30, 2004 (to May 31, 2004, if required), 5. Carteret County has agreed to continue monitoring the Phase 1 area (Pine Knoll Shores to Indian Beach (including Salter Path)) beyond November 2003, if adequate recovery of mole crabs and coquina clams does not occur. If required the monitoring would be extended to November 2004. Please note if the Section 933 project is not funded, Carteret County **will not** extend the monitoring until November 2004.

**Comment 15:** Section 305(b)(4)(B) of the MSFCMA and NGAA Fisheries' implementing regulation at 50 CFR Section 600.920(k) require your office to provide a written response to this letter within 30 days of its receipt. If it is not possible to provide a substantive response within 30 days, then in accordance with our "findings" with your Regulatory Functions Branch, an interim response should be provided to NOAA Fisheries. A detailed response then must be provided prior to final approval of the action. Your detailed response must include a description of measures proposed by your agency to avoid, mitigate, or offset the adverse impacts of the activity. If your response is inconsistent with our EFH Conservation Recommendations, you must provide a substantive discussion justifying the reasons for not following the recommendations.

**Response:** By letter dated June 27, 2003, we provided your office with our written responses to the five EFH Recommendations. By letter dated July 16, 2003 (see Appendix 2), NMFS provided their comments to our letter dated June 27, 2003, which responded to the EFH Recommendations. The NMFS still had unresolved issues regarding recovery of mole crabs/coquina clams and developing a feasibility plan for beach restoration in the event that incompatible material is placed on the beach. As indicated during our meeting on June 24, 2003, a representative from Carteret County stated that they would continue monitoring the Phase 1 area (Pine Knoll Shores to Indian Beach (including Salter Path)) beyond November 2003, if adequate recovery of mole crabs and coquina clams does not

occur. If required, the monitoring would be extended to November 2004. Please note if the Section 933 project is not funded, Carteret County will not extend the monitoring until November 2004. Since the material pumped to Bogue Banks from Brandt Island and the Morehead City Harbor inner channels is compatible (see Table 1, above), the Corps will not develop a feasibility plan for beach restoration in the event that incompatible material is placed on the beach. Therefore, it is our position that impacts of the project on the environment will be within acceptable levels.

**Comment 16:** Finally, these comments do not satisfy your consultation responsibilities under Section 7 of the Endangered Species Act of 1973, as amended. If any activity(s) "may effect" listed species and habitats under the purview of NOAA Fisheries, consultation should be initiated with our Protected Resources Division at the letterhead address.

**Response:** See NMFS letter (5.04) dated June 13, 2003, above, which indicates that if the Corps abides by all of the terms and conditions of the 1997 RBO, the proposed Section 933 project will not likely adversely affect any listed species under NMFS purview.

**Comment 17:** Thank you for the opportunity to provide these comments. Related questions or comments should be directed to the attention of Mr. Ronald S. Sechler at our Beaufort Office, 101 Pivers Island Road, Beaufort, North Carolina, or at (252) 728-5090.

**Response:** We appreciate your comments on this matter.

**5.06 USFWS; letter dated June 6, 2003, regarding formal Section 7 consultation under the Endangered Species Act of 1973, as amended.**

**Comment 1:** This letter acknowledges the U.S. Fish and Wildlife Service's (Service) May 5, 2003 receipt of your May 3, 2003 letter requesting initiation of formal section 7 consultation under the Endangered Species Act of 1973, as amended (16 U.S.C. § 1531 et seq.). The consultation concerns the possible effects of your proposed Morehead City Harbor Section 933 Project on Federally-listed species, including the roseate tern (*Sterna dougallh*), piping plover (*Charadrius melodus*), West Indian manatee (*Trichechus manatus*), seabeach amaranth (*Amaranthus pumilus*), and green (*Chelonia mydas*), hawksbill (*Eretmochelys imbricata*), Kemp's ridley (*Lepidochelys kempii*), leatherback (*Dermochelys coriacea*), and loggerhead (*Caretta caretta*) sea turtles.

**Response:** Noted.

**Comment 2:** All information required of you to initiate consultation was either included with your letter or is otherwise accessible for our consideration and reference. The proposed action, as detailed in your draft Environmental Assessment and Evaluation Report, dated May 2003, consists of placing approximately 6.3 million cubic yards of dredged material stored in the Brandt Island disposal site and sediments from maintenance dredging of the inner and outer harbor navigation channels of Morehead City and Beaufort Inlet along approximately 13.2 miles of oceanfront beaches of Bogue Banks (including Fort Macon, Atlantic Beach, Pine Knoll Shores, Salter Path, and Indian Beach), Carteret County, North Carolina (hereafter referred to as Morehead City Harbor Section 933 Project). The proposed project is a one-time action scheduled to begin

November 16, 2003 and continue for up to 16 months (estimated completion date April 30, 2005). However, the pump-out of Brandt Island and disposal of these sediments on the oceanfront beaches of Bogue Banks is expected to occur, as it has in the past, every 8 to 10 years.

**Response:** See our modified project description found in Section 2.0 of the FONSI and in response to Comment 1 within the NMFS letter (5.05) dated June 5, 2003, above.

**Comment 3:** The Service prepared a biological opinion, dated December 7, 1989, for the proposed dredging of Morehead City Harbor and subsequent disposal of dredged sediments in a Morehead City Ocean Dredged Material Disposal Site, an upland diked dredge disposal area on Brandt Island, or pumped directly onto the oceanfront beach at Atlantic Beach. In our biological opinion we concurred with your findings that the proposed action would have no effect on the piping plover, roseate tern, and hawksbill and Kemp's ridley sea turtles, and that the proposed action may affect loggerhead and green sea turtles. Our biological opinion concluded that the proposed action was not likely to jeopardize the continued existence of loggerhead and green sea turtles.

**Response:** Agree.

**Comment 4:** An amendment to the biological opinion, dated April 19, 1993, was prepared in response to updated project plans of the original dredge and disposal action. The project modifications included the disposal of additional dredged sediment material on oceanfront beaches from Fort Macon State Park to Pine Knoll Shores and a different pipeline route than reviewed in the original project. The amended biological opinion concluded that the proposed project modifications were not likely to jeopardize the continued existence of loggerhead and green sea turtles. The amended biological opinion also included a conference opinion for the proposed Federally-threatened seabeach amaranth in which we concluded that the proposed action would not likely jeopardize the continued existence of this species.

**Response:** Agree.

**Comment 5:** In your Biological Assessment, dated May 2003, you determined that the updated project plans for the proposed Morehead City Harbor Section 933 Project are not likely to adversely affect the roseate tern or the West Indian manatee. Moreover, you determined that the proposed activities may affect the piping plover, seabeach amaranth, and green, hawksbill, Kemp's ridley, leatherback, and loggerhead sea turtles. We concur with your determination that the proposed action may affect the hawksbill, Kemp's ridley, and leatherback sea turtles; however, we conclude that the proposed action is not likely to adversely affect these species. In addition, based on the information provided and other information available, we concur with your determination that the proposed action is not likely to adversely affect the roseate tern. With regard to the West Indian manatee, however, the Service would concur with your determination that the proposed action is not likely to adversely affect this species if the measures detailed in the *Precautionary Measures For Activities In North Carolina Waters Which May Be Used By The West Indian Manatee* (attached) are implemented.

**Response:** We will abide by conditions and restrictions found within the *Precautionary Measures For Activities In North Carolina Waters Which May Be Used By The West Indian Manatee*.

**Comment 6:** Because the proposed action is different in timing and scope from the project reviewed in the original biological opinion and amendment, and new information is available on the piping plover, seabeach amaranth, and green and loggerhead sea turtles, we are initiating formal consultation for these species. Section 7 allows the Service up to 90 calendar days to conclude formal consultation with your agency and an additional 45 calendar days to prepare our biological opinion (unless we mutually agree to an extension). However, we expect to provide you our second amendment to the biological opinion by late-July. Based on the information provided and other information available, we anticipate the second amendment to conclude that the proposed action is not likely to jeopardize the continued existence of the piping plover, seabeach amaranth, and green and loggerhead sea turtles. The second amendment will primarily update the incidental take statement and the reasonable and prudent measures with their implementing terms and conditions based on information obtained since the last project review and first amendment to the biological opinion.

**Response:** Agree.

**Comment 7:** We have assigned log number 03-S243 to this consultation. Please refer to that number in future correspondence on this consultation. If you have any questions or concerns about this consultation or the consultation process in general, please feel free to contact me or Mr. David Rabon of my staff at (919) 856-4520 extensions 11 or 16, respectively.

**Response:** We appreciate your comments on this matter.

#### **5.07 USFWS; letter dated June 6, 2003, regarding the NEPA review of the EA.**

**Comment 1:** The Service issued a draft Fish and Wildlife Coordination Act (FWCA) report on the Federal shore protection project for Bogue Banks in November 2002 (available on our website at <http://nc-es.fws.ov/pubs/fwcafbogue.html>). This project is distinct from the Section 933 project and is a storm damage reduction project along the entire 26-mile length of Bogue Banks. In this report the Service summarized the fish and wildlife resources in the Bogue Banks area, which includes the project area for the proposed Section 933 project. The Service incorporates this report by reference, particularly its list of conservation measures for avoiding, minimizing and mitigating potential adverse environmental impacts resulting from the placement of fill material via dredging equipment on oceanfront beaches.

**Response:** As indicated in Section 2.0 of the FONSI, the Section 933 project is a one-time placement of up to 6.3 million cubic yards of dredge maintenance material from Brandt Island and the Morehead City Harbor navigations channels onto Bogue Banks, from Fort Macon State Park to Indian Beach (a distance of about 13.2 miles). Section 1.2 of the FONSI states that the purpose and need of the proposed Section 933 project is to “utilize beach quality sand dredged from the adjacent Federal navigation channels and from Brandt Island in order to stabilize eroding beaches on Bogue Banks.”

The conservation measures found within the FWCA report dated November 2002 deal with the long-term (i.e., 50 years project life) 24-mile long, Bogue Banks Shore Protection Feasibility Study. Many of the 22 conservation measures found within the FWCA are not applicable to the proposed action, since these measures are not within the project scope of the Section 933. For example, conservation measures 3, 4, 13, and 15 deals predominantly with borrow areas (i.e., the 43 dredge disposal islands in Bogue Sound and offshore borrow areas). The Section 933 will not impact these 43-dredge disposal islands in Bogue Sound and there are no off-shore borrow areas in the Section 933 project. Conservation measures 1, 2, and 7 deal predominantly with the construction of and planting of dunes (the Section 933 is not constructing any dunes, see Section 1.03 of the EA). Conservation measures 8, 10, 12, and 14 deal predominantly with phased construction of the 24-mile project area, renourishment intervals, avoiding CBRA zones and conservation lands (the Section 933 is a one-time action and will not impact CBRA zones and/or conservation lands). Conservation measures 16, 17, 18, 19, 20, and 21 deals predominantly with mitigation for adverse impacts to the environment (there is no mitigation proposed for the Section 933).

The remaining conservation measures found within the FWCA are addressed in the FONSI. Conservation measures 5, 6, and 11 deals with construction windows (see response to the NMFS and USFWS letters (5.04 and 5.06, respectively) dealing with endangered species, above and the NCWRC letter (5.14), below). Conservation measure 9 deals with sand compatibility (see Table 1, above). Conservation measure 22 deals predominantly with long-term monitoring of the long-term study (see revised project description in Sections 2.0 and 9.0 of the FONSI).

**Comment 2:** The Service supports projects that (1) are ecologically sound; (2) are the least environmentally damaging alternative; (3) have avoided and minimized damage or loss of fish and wildlife resources and uses; (4) have adopted all important recommended conservation measures to compensate for unavoidable damage or loss to fish and wildlife resources; and (5) are clearly a water dependent activity with a demonstrated public need if there are wetland or shallow water habitats in the project area (January 23, 1981, Federal Register v. 46, n. 15, p. 7659). The Service does not believe that this project, as currently proposed, gives equal consideration to fish and wildlife resources and may generate adverse impacts to aquatic resources of national importance. In addition, we do not think this project meets the 404(b)(1) guidelines for the Clean Water Act.

**Response:** The proposed Section 933 project is:

1. ecologically sound (see Sections 5.00 and 6.00 of the EA and response to NMFS letter (5.05) dated June 5, 2003, comment # 14, above),

2. is the least environmental damaging (see revised section 2.0 of the FONSI and response to NMFS letter (5.05) dated June 5, 2003, comment # 14),

3. has avoided and minimized damage or loss of fish and wildlife resources and uses (see revised Section 2.00 of the FONSI and response to NMFS letter (5.05) dated June 5, 2003, comment #12),

4. see response to Comment 1, above, and



5. is clearly a water dependent activity with a demonstrated public need (see Section 1.02 of the EA, Appendix D of the EA (Economic Analysis), and the Section III - Economic Benefits of the Draft Evaluation Report). We also believe that the EA does give equal consideration to both fish and wildlife resources (see Sections 4.00 and 5.00 of the EA). Moreover, the project does meet the 404(b)(1) guidelines for the Clean Water Act (see Attachment A of the EA).

**Comment 3:** Environmental Acceptability. The project documents do not adequately consider the locally constructed Bogue Banks Beach Restoration Project (BBBRP). The Evaluation Report and EA cite recent storm damages and erosion as the need for the project, and reduction in storm damages and erosional losses as the beneficial use of the dredged material. However, the Evaluation Report states that "the most likely future" scenario along the Section 933 project area is that erosion control measures by local and state interests are not expected to provide significant protection against the erosion and flooding associated with hurricane and storm events" (p. 19).

The Service strongly disagrees with this finding. The Section 933 project evaluation determined that a 30-foot wide addition to the beach would significantly reduce storm damages, for a total of \$8.95 million in annual benefits in Pine Knoll Shores and Indian Beach. The BBBRP had a design width of over 30 feet throughout these communities, however. To make a determination that the locally constricted beach wider than what the Corps has determined will significantly reduce storm damages and erosional losses (30 feet) as insignificant is not sound.

**Response:** The proposed Section 933 project considered the locally funded beach nourishment project in place and part of the "without project" condition. Benefits for the Section 933 project are beyond those provided by the locally funded beach nourishment project. Neither projects (i.e., the proposed Section 933 or the locally funded beach nourishment project) were optimized for hurricane and storm reduction or provides for periodic nourishment.

**Comment 4:** Secondly, the material to be pumped from Brandt Island (an estimated 4 mcy) has not been tested for sedimentary characteristics known to be ecologically significant to fish and wildlife resources (i.e., carbonate content, color, grain size). The Corps assumes that material presently within the navigational channels of the inner harbor are representative of the dredged materials currently residing in Brandt Island. The EA does not include the sedimentary analyses of this material (which the Service understands is presently underway) and makes the assumption that it is suitable for beach placement.

**Response:** See response to Comment 11: EFH Recommendations 3 within the NMFS letter (5.05) dated June 5, 2003, above.

**Comment 5:** The Service does not concur with either of these assumptions. Material previously pumped from Brandt Island to Fort Macon contained dark gray and highly shelly material that created tall scarps that are still sometimes visible at the park (Figure 1 of the USFWS letter). This material is similar to the ecologically incompatible material used in the BBBRP. It is not reasonable to assume that all of the material

presently within Brandt Island is ecologically compatible with the native beaches of Bogue Banks. The Service strongly recommends sampling the sediments currently within Brandt Island to determine the compatibility of this material for beach placement.

**Response:** See response to comment 4, above.

**Comment 6:** Moreover, sediments that settle within navigation channels may be significantly finer than beach sands and contain high percentages of silt and clay. The Evaluation Report and EA assume that only beach quality sand will be present in the deepwater channels of the inner harbor. That assumption is premature. Since geotechnical data are presently being compiled for the sediments in the inner harbor channels, the Service recommends that any evaluation of the suitability of the material for beach placement be delayed until the data are available.

**Response:** See response to comment 4, above.

**Comment 7:** The least environmentally damaging alternative would utilize sediments that are ecologically compatible with Bogue Banks beaches. A recent study by the Service determined that native sediments of North Carolina beaches contain less than 12.8 % gravel (sediments larger than 2 millimeters (mm)), less than 4.1 % fines (sediments smaller than 1/16 mm), and an average of 7.4 % carbonate or shelly material. Site specific data available for Bogue Banks indicate that the native sediments for the sandy beach ecosystem contain 4.9 %, gravel, 0.6 % fines, and 13.3 shell material. The limited data utilized to assess sediment compatibility for the Section 933 project indicate that the proportion of fines may be 6 % to 12 % (p. EA-15, EA-16). The absence of sedimentary data for the Brandt Island fill material preclude a determination that the material is similar to existing material and suitable for fish and wildlife resources. Previous experiences with ecologically incompatible sediments at both Fort Macon and the BBBRP project area do not support a reasonable assumption that the Section 933 project will only place beach compatible material on the beaches of Bogue Banks.

**Response:** By e-mail dated June 30, 2003, Mr. John Ellis, USFWS in the Raleigh Field Office indicated that there are two "options" suggested by USFWS for sediments found in Brandt Island. Option 1 is defined as sediment that has the following characteristics: Carbonate (shell) content – 12.4 %; gravel content – 4.9 %; fines content – 0.6% by weight; organic matter content – less than or equal to that of native beach material; Dominant grain size – medium to fine grained sand. Option 2 is defined as sediment that has the following characteristics: Carbonate - up to 25.13% by weight; Gravel – up to 16.84% by weight; Fines – up to 7.72% by weight; Organic Matter Content – less than or equal to that of the native beach; Dominant Grain Size – should be medium to fine grained sand. The Corps is not required to comply with these criteria, but according to the compatibility analysis found in response to Comment 11: EFH Recommendations 3 within the NMFS letter (5.05) dated June 5, 2003, the material from Brandt Island is within the parameters of Option 2. The dredged material placed on Bogue Banks is compatible (see response to Comment 11: EFH Recommendations 3 within the NMFS letter (5.05) dated June 5, 2003, above).

**Comment 8:** Ecological Impacts. The local communities of Pine Knoll Shores, Indian Beach and Emerald Isle currently have a Regulatory Permit for the three phase Bogue Banks Beach Restoration Project along 16.8 miles of beach on Bogue Banks. Pine Knoll Shores and Indian Beach were constructed in 2001-02 (Phase I). Eastern

Emerald Isle was constructed from January to March 2003 (Phase II). The third phase of this project is scheduled for western Emerald Isle during the winter of 2004-05. These oceanfront beaches were impacted by a dredge and fill project with dimensions similar to those proposed by the Section 933 project.

**Response:** We disagree. As indicated in Section 1.02 of the EA and the Coastal Analysis Appendix found in the Draft Evaluation Report (page Appendix C-24), states “phase 1 of the local nourishment project resulted in the placement of approximately 1.73 million cubic yards of material on Pine Knoll Shores to Indian Beach, a distance of 39,202 feet. The berm-only project averaged less than 45 cubic yards per foot, which is a very small beachfill.” Table 1-1 in the EA provides maximum quantities (cubic yards per foot) for both the Section 933 and the base disposal plan. The average maximum sediment disposal rate (cubic yard per foot) for the proposed Section 933 is 88 for Fort Macon, 49 for Atlantic Beach, 124 for Pine Knoll Shores, and 105 for Indian Beach (including Salter Path).

**Comment 9:** The available data indicate that the sandy beach ecosystem in the BBBRP area has not recovered, and the Section 933 project would eliminate any recovery gains made by the system in the last year. Furthermore, the Section 933 project would bury the closest recruitment population for macroinvertebrates at Atlantic Beach. The macroinvertebrate population, dominated by coquina clams (*Donax variabilis*) and mole crabs (*Emerita talpoida*), is the prey base for regionally and nationally significant waterbirds, shorebirds, and fishery species. The Service believes that burial of the macroinvertebrate prey population twice within a three year period will generate significant ecological impacts, delaying the recovery of the food source for longer than would occur if the Section 933 project were constructed after the prey base within the BBBRP area was fully recovered.

**Response:** We disagree. The results from the monitoring performed by Coastal Science Associates (CSA), Inc. see (CSAi 2002 B), and (CSAi 2003), as a requirement of the Department of the Army permit #200000362 for Phase I of the local beach nourishment project and the data provided by Dr. C.H. Peterson et al does not agree with your conclusion (see response to Comments 2 and 3 of the Dr. C.H. Peterson letter (5.18) dated May 28, 2003, below and response to Comment 14 of the NMFS letter (5.05) dated June 5, 2003).

**Comment 10:** Furthermore, the cumulative impacts of multiple dredge and fill projects on Bogue Banks within a short period of time will be significant. The Service does not concur with the Corps' finding that cumulative impacts will be insignificant. Phase I of the BBBRP was constructed from December 2001 through April 2002. Phase II of the 13BBRP was constructed from January to March 2003. Maintenance dredge disposal of navigational channels in and around the Morehead City harbor placed 209,348 cubic yards of material at Fort Macon during early 2002. The Section 933 project proposed to place 6.3 mcy of material on Bogue Banks in 2003, 2004 and 2005. Phase III of the BBBRP is currently scheduled for the winter months of 2004 and 2005.

**Response:** See response to comment 12 within the NMFS letter (5.05) dated June 5, 2003, above.

**Comment 11:** The cumulative impacts of five large scale dredge and fill projects on the same barrier island within less than 4 years will be significant. Less than one mile

of oceanfront beach on the island would remain undisturbed by fill placement in western Emerald Isle near Bogue Inlet. That less than one mile area would be indirectly impacted by the proposed Bogue Inlet Relocation Project during the same time period (as Bogue Inlet is proposed for relocation and/or mining for Phase III of the BBBRP). Migratory populations of waterbirds, shorebirds and fishery resources are not likely to have reliable sources of food along virtually the entire 26-mile long barrier island for a number of years.

**Response:** See response to comment 9, above, comment 2 within the Dr. C. H. Peterson letter (5.18) dated May 28, 2003, below, and comment 8 within the NCWRC letter (5.14) dated May 27, 2003, below.

**Comment 12:** Although the islands to the east and southwest of Bogue Banks are in conservation, several studies indicate that migratory birds have high site fidelity to migratory staging, stopover and overwintering sites that are smaller in areal extent (e.g., 10 kilometers (6.2 miles)) than Bogue Banks is long (e.g., 41.8 km (26 mile) (Dinsmore et al. (1998); Pfister et al. (1998); Johnson and Baldassarre (1988)). The Section 933 project documentation concludes that habitat disturbance from beach fill projects is not likely to have population level impacts on avifauna Dinsmore et al. (1998, p. 171)), however, concluded that "habitat loss or alteration [on the Outer Banks of North Carolina] could adversely affect the Atlantic Flyway population of several [bird] species (e.g., Sanderlings) as well as the threatened Piping Plover." The draft EA does not adequately address the continuous perturbation of the Bogue Banks sandy beach ecosystem and the impacts it will have on migratory birds. Chronic disturbance of valuable foraging habitat may be more important than occasional disturbances and may affect shorebird survival rates (Pfister et al. (1992, 1998); West et al. (2002)). The Service disagrees with the Corps' finding that the proposed project will not significantly impact migratory bird populations and recommends that an Environmental Impact Statement be prepared to fully evaluate this concern.

**Response:** See response to Comment 9, above, Comment 8 within the NCWRC letter (5.14) dated May 27, 2003, below and Comment 2 within the Dr. C. H. Peterson letter (5.18) dated May 28, 2003, below. Additionally, see response to Comment 13, below regarding the need for an EIS.

**Comment 13:** As currently proposed, the Section 933 project anticipates a year-round construction schedule that would start November 16, 2003 and proceed for up to 16 months through April 30, 2005. The Corps proposes a Finding of No Significant Impact (FONSI) for this construction schedule, even though the generally accepted environmental window for dredge and fill projects in North Carolina occurs during the winter months from November 16 to the end of March or April annually. The Corps has determined that the year-round construction schedule and the use of hopper dredges may adversely impact federally-protected species such as sea turtles, piping plover (*Charadrius melodus*) and seabeach amaranth (*Amaranthus pumilus*). The Service contends that a FONSI is inconsistent with any shoreline stabilization or dredge disposal project (on beaches) scheduled for the summer months, which are the peak biological productivity period for coastal North Carolina.

**Response:** The construction window for the proposed Section 933 project has been revised (see Section 2.0 of the FONSI). We have reviewed all the comments received on the EA. Based our review of these comments and investigations required to

respond to the comments, we believe that the EA/FONSI is an appropriate document for the proposed action and it fully complies with NEPA. Moreover, requirements for Section 7 of the Endangered Species Act of 1973, as amended have been met. The project is covered under a USFWS Biological Opinion dated July 22, 2003 and a NMFS Regional Biological Opinion dated 1997. All reasonable and prudent measures, as well as all terms and conditions of the USFWS Biological Opinion dated July 22, 2003 (See Appendix 2) and the NMFS Regional Biological Opinion dated 1997 (see letter dated June 13, 2003 from NMFS found in Appendix 2) will be complied with. Therefore, the proposed action will not adversely effect sea turtles, piping plovers, and seabeach amaranth within the project area.

**Comment 14:** 404(b)(1) Guidelines. Environmental impacts should first be avoided, then minimized. Any unavoidable environmental impacts should then be compensated with mitigation. The draft EA has determined that the proposed Section 933 project has avoided and minimized environmental impacts. The Service does not concur with this finding.

**Response:** See response to comment 2, above.

**Comment 15:** If the project proceeds, the Service has identified the following conservation measures to avoid and minimize environmental impacts from a Section 933 project at Pine Knoll Shores and Indian Beach: 1) Avoid periods of peak biological activity, limiting construction to the environmentally acceptable window of November 16 to March 1 annually.

**Response:** See response to comment 10 in the NMFS letter (5.05) dated June 5, 2003 above.

**Comment 16:** Conservation Measure 2) Use fill material that has been adequately evaluated and is ecologically compatible with the native beach material on Bogue Banks.

**Response:** See response to Comment 11: EFH Recommendations 3 within the NMFS letter (5.05) dated June 5, 2003, above.

**Comment 17:** Conservation Measure 3) Update the without project condition and existing conditions of the project area to include the locally constructed Bogue Banks Beach Restoration Project.

**Response:** See response to comment 9 found within the NMFS letter (5.05) dated June 5, 2003, above.

**Comment 18:** Conservation Measure 4) Avoid pumping out Brandt Island during colonial waterbird and shorebird nesting seasons, when these species are likely to be nesting on Brandt Island,

**Response:** See response to Comments 11 and 12 within the NCWRC letter (5.14) dated May 27, 2003, below.

**Comment 19:** Conservation Measure 5) Avoid destruction of habitat for the as yet unidentified skipper (*Atrytonopsis* new species 1) Brandt Island, which may be

endemic to the greater project area, until ecological studies of the species are completed.

**Response:** See response to comment 13 within the NCWRC letter (5.14) dated May 27, 2003, below.

**Comment 20:** Conservation Measure 6) Avoid complete elimination of nesting waterbird and shorebird habitat on Brandt Island by configuring the remaining dikes and spoil material to include a bare sand island less than 15 feet in elevation and separated from vegetated areas by a minimum of 100 yards of deep water.

**Response:** See response to comment 12 within the NCWRC letter (5.14) dated May 27, 2003, below.

**Comment 21:** The Service has also identified several potential measures for compensatory mitigation for unavoidable ecological impacts: 1) Maintain a semi-permanent bare ground nesting island within the Brandt Island complex for shorebird and waterbird nesting, separated from vegetated areas by at least 100 yards of deep water to minimize predation of nests.

**Response:** See response to comment 12 within the NCWRC letter (5.14) dated May 27, 2003, below.

**Comment 22:** Compensatory Mitigation 2) Enhance shorebird and waterbird nesting and foraging habitat in the area by working with the local sponsors to implement leash laws, bird nesting areas (denoted by signage and post and rope fencing), prohibiting beach driving in certain areas, and banning kites and fireworks. West Point near Bogue Inlet is a potential location for such mitigation.

**Response:** See response to comment 14 within the NCWRC letter (5.14) dated May 27, 2003, below.

**Comment 23:** Compensatory Mitigation 3) Implement year-round bird monitoring in the project area to determine the longevity of ecological impacts to nesting and foraging waterbirds and shorebirds,

**Response:** See response to comment 15 within the NCWRC letter (5.14) dated May 27, 2003, below.

**Comment 24:** Compensatory Mitigation 4) Implement a survey and monitoring program for the unnamed skipper to aid in the identification, description and conservation of this potentially new species.

**Response:** See response to comment 13 within the NCWRC letter (5.14) dated May 27, 2003, below.

**Comment 25:** Compensatory Mitigation 5) Enhance the recovery of macroinvertebrate species in the fill placement areas by harvesting and transplanting dominant species or stocking the new fill material with cultured populations.

**Response:** See response to comment 9 within the NCWRC letter (5.14) dated May 27, 2003, below.

**Comment 26:** Compensatory Mitigation 6) Design a remediation plan for inadvertent placement of incompatible fill materials on the beach. Remediation measures may include removal of incompatible material, replacement with compatible material, and increased scientific monitoring of the magnitude and longevity of ecological impacts. The Service believes that incorporation of these conservation measures to avoid, minimize and mitigate for ecological impacts would satisfy the 404(b)(1) guidelines. At present the draft EA does not include conservation measures to sufficiently avoid and minimize impacts.

**Response:** See response to Comment 13 within the NMFS letter (5.05) dated June 5, 2003, above.

**Comment 27:** In conclusion, the Service does not believe that the proposed Section 933 project for Bogue Banks, as presently designed, gives equal consideration to fish and wildlife resources. The project as proposed does not meet the criteria of the Service's Mitigation Policy. A Finding of No Significant Impact is not warranted and the Service requests an Environmental Impact Statement be prepared. The ecological impacts of the project are likely to be significant, particularly if the current perturbations to the Bogue Banks sandy beach ecosystem and the migratory populations that it supports are continued. In accordance with the procedural requirements of the 1992 404(q) Memorandum of Agreement, Part IV.3(a), we are advising you that the proposed work may result in substantial and unacceptable impacts to aquatic resources of national importance.

**Response:** See response to comment 14 within the NMFS letter (5.05) dated June 5, 2003, above. The procedural requirements contained in 1992 404 (q) MOA, part IV, 3(a) strictly deals with Regulatory issues (i.e., individual Section 404 permit issues) and not civil works projects. The proposed 933 project is a civil works action and is consistent with Section 404 requirements.

By letter dated July 21, 2003, the USFWS commented on the Draft Unsigned FONSI. USFWS comments that were not addressed above dealt largely with the Bogue Banks Long-term Shore Protection study, beach access, Section 7 consultation, construction window, monitoring of the project by the Corps' inspector, sand compatibility issues, unsuitable material found within the navigation channels, developing a feasibility plan for beach restoration in the event that incompatible material is placed on the beach, and the Corps considering waterbird nesting habitat on the proposed 61-acre Environmental Sustainable Confined Disposal Facility (ESCDF) near Pelletier Creek, off Bogue Sound, in Morehead City.

Monitoring data from the locally funded beach nourishment project will be used to prepare an environmental impact statement (EIS) for the proposed the Bogue Banks Long-term Shore Protection study. Beach access issues are addressed in the NCCF (5.21) and Duke University (5.22) letters, below. We have revised the sections in the FONSI dealing with Section 7 consultation. During the construction of the Section 933 project, if the contractor experiences mechanical difficulties or delays from November 1, 2003 to April 30, 2004, he would be given an equal amount of time during May 2004. This means that if the contractor experiences 13 days down time (from November 1, 2003 to April 30, 2004), he would be

given 13 days in May to recover the down time. Under no circumstance, would the contractor be given an unequal amount of time (i.e., down 13 days and given 31 days to recover in May). The Corps inspector assigned to the Section 933 will ensure that suitable material is placed on Bogue Banks. The Corps inspector does not have the authority to direct the contractor to relocate but will notify the Contracting Officer in Wilmington, if problems arise. Sand compatibility issues have been already been addressed in the NMFS letter (5.05) dated June 5, 2003, above. Additionally, regarding unsuitable material within the navigation channels, see response to Comment 13 within the NMFS letter (5.05) dated June 5, 2003. The Corps will not remove unsuitable material from Bogue Banks, since the material from the inner harbor is compatible (see Table 1). Lastly, the ecologically sustainable confined disposal facility (ESCDF), which is under consideration for development in Bogue Sound near Peletier Creek is anticipated to provide several categories of environmental enhancement benefits. Components of the plan will continue to be coordinated with other agencies prior to its finalization, so that habitat value can be included for the resources of greatest concern. However, no commitments can be made to the proposed Section 933 project with regard to the proposed ESCDF, because it would be a part of the Atlantic Intracoastal Waterway (AIWW) project. Its funds, management, and commitments would all be linked to the AIWW project, and it cannot bear commitments on behalf of other Federal projects.

**5.08 North Carolina Department of Administration, Ms. Chrys Baggett, Environmental Policy Act Coordinator; letter dated June 9, 2003.**  
**(Transmitting the following intergovernmental review comments and recommendations.)**

**Comment 1:** The above referenced environmental impact information has been submitted to the State Clearinghouse under the provisions of the National Environmental Policy Act. According to Q.S. 113A-10, when a state agency is required to prepare an environmental document under the provisions of federal law, the environmental document meets the provisions of the State Environmental Policy Act: Attached to this letter for your consideration are the comments made by agencies/organizations tip this office in the course of this review.

**Response:** Noted.

**Comment 2:** If any further environmental review documents are prepared for this project, they should be forwarded to this office for intergovernmental review. Should you have any questions, please do not hesitate to call.

**Response:** Noted.

**5.09 NCDENR; memorandum to Ms. Chrys Baggett, NC State Clearinghouse, from Ms. Melba McGee, Environmental Review Coordinator, dated June 6, 2003, (which transmitted the following NCDENR Division letters to the State Clearinghouse).**

**Comment 1:** The Department of Environment and Natural Resources has completed its review of the proposed draft evaluation report. The purpose of this report is to investigate the placement of dredged maintenance material along a portion of Bogue Banks beaches.



**Response:** Noted.

**Comment 2:** The primary concern with the beach disposal is the potential for indirect impacts to mole crabs, coquina clams, sea turtles and shore birds due to potential reductions on food resources. The department is equally concerned with the effects of year round disposal on fish and birds, the quality of the disposal material, its effect on sand temperature, meeting recommended moratorium deadlines and monitoring. The department does not believe the Environmental Assessment provided a thorough discussion of these points and believes division's concerns should be thoroughly addressed prior to this project moving forward. It is our recommendation that the Corps of Engineers would benefit more by preparing an Environmental Impact Statement. The Environmental Impact Statement would give a more accurate picture of the direct impacts and evaluate whether the dredge disposal would have insignificant impacts on the beach ecosystem.

**Response:** See responses to memo's from NCDMF, NCWRC, and the letter from Dr. Charles H. Peterson, below, as well as the revised project description found in Section 2.0 of the FONSI. Additionally, we have reviewed all the comments received on the EA.

Based upon our review of these comments and investigations required to respond to NCDENR and other comments, we believe that the EA/FONSI is an appropriate document for the proposed action and it fully complies with NEPA.

**Comment 3:** Thank you for the opportunity to respond. The Corps is encouraged to notify our reviewing divisions with any problems or questions they may have in resolving their concerns. Final approval will depend on the impacts of this project being adequately addressed.

**Response:** Noted.

**5.10 NCDENR; memorandum to Ms. Melba McGee, Environmental Coordinator, dated May 27, 2003, from Preston P. Pate, Jr., Director, Division of Marine Fisheries.**

**Comment:** I have reviewed the following comments provided by the District Manager and/or Bio-Supervisor and concur with their recommendations.

**Response:** Noted.

**5.11 NCDENR; E-mail to Ms. Melba McGee, Environmental Coordinator, dated June 6, 2003, from Mike Street, Division of Marine Fisheries.**

**Comment:** Melba -- Mike Marshall and I have discussed the subject project. We agree that there are several issues of sufficient importance that they cannot be adequately addressed in a revised Environmental Assessment. Of special concern are cumulative impacts of this proposed one-time project and all the other proposed (reasonably foreseeable) and ongoing beach nourishment projects along Bogus Banks, including work in both Beaufort and Bogue Inlets. It is simply unrealistic

scientifically to continue to examine these many projects independently when the effects of these projects are not independent. Therefore, the Division of Marine Fisheries urges that an Environmental Impact Statement be prepared for the subject project. Street.

**Response:** We understand that the local beach nourishment project (Department of the Army Permit #200000362) is important to consider in light of the proposed Section 933 project, that's why the local project was thoroughly described in Section 1.02 of the EA. The Cumulative Impact Assessment (CIA) found in Attachment E of the EA, takes into account the three phases of the local beach nourishment project on Bogue Banks, as well as the potential delay of Phase 3 until the NCDCM and U.S. Army Corps of Engineers, Wilmington District, Regulatory Division issues the required permits for the proposed Bogue Inlet Channel Relocation Project. The CIA considers known past, present and the reasonably foreseeable future sand placement on the statewide scale and the project vicinity (i.e., Bogue Banks) scale over a 50-year period from 1965 to 2015.

We have reviewed all the comments received on the EA and have revised the project description found in Section 2.0 of the FONSI. Based upon our review of these comments and investigations required to respond to NCDMF and the other comments, we believe that the EA/FONSI is an appropriate document for the proposed action and it fully complies with NEPA.

**5.12 NCDENR; memorandum to Ms. Melba McGee, Environmental Coordinator, dated May 19, 2003, from Mike Marshall, Division of Marine Fisheries.**

**Comment 1:** The NC Division of Marine Fisheries (DMF) has reviewed the subject environmental assessment (EA) under authority of G. S. 113-131 and according to the Policies of the North Carolina Marine Fisheries Commission for Beach Dredge and Fill Projects, and we offer the following comments.

**Response:** Noted.

**Comment 2:** The subject EA discusses the impacts of lengthening the authorized beach disposal area for the Morehead City Harbor navigation project from 7 miles to 13 miles. The increased area will include western Pine Knoll Shores and Indian Beach along with the authorized areas of Fort Macon, Atlantic Beach and eastern Pine Knoll Shores. Continuous pipeline construction is proposed beginning November 16, 2003 and construction is possible after May 1, 2004 in western Pine Knoll Shores and Indian Beach.

**Response:** See our modified project description found in Section 2.0 of the FONSI and in response to Comment 1 within the NMFS letter (5.05) dated June 5, 2003, above.

**Comment 3:** Construction on a year round basis will result in impacts to local recreational and commercial fishing activities. Public trust uses of the surf zone and intertidal beach will also be affected during intensive use periods if construction extends into the summer months. These impacts should be examined in the EA.

**Response:** As indicated in our response to comment 2, above, we will no longer work year round on the beach and therefore the proposed action will not adversely impact local recreational and commercial fishing activities. See response to Comment 14 of the NMFS letter (5.05) dated June 5, 2003, above.

**Comment 4:** The EA does not address the effects of year round pumping on beach prey species. The anticipated rate of 200 feet per day could have significant impacts on populations of mole crabs and coquina clams if allowed during the months when these species inhabit the intertidal beach. These impacts need to be discussed.

**Response:** As indicated in our response to Comment 3, above, the proposed Section 933 project will no longer be accomplished year round. Therefore, we believe that beach prey species will not adversely be impacted. Also see response to Comment 2, within the Dr. C. H. Peterson letter (5.18) dated May 28, 2003, below

**Comment 5:** The EA rejects our earlier recommendation to monitor the impacts of the project and to coordinate that monitoring with the Bogue Banks monitoring plan. This course of action presents several problems that will affect our comments on further requests for large scale beach nourishment utilizing offshore borrow sites. The Morehead City Harbor Dredging and 933-beach disposal will progressively altered by pumping spoil onto sampling stations designed to evaluate the impacts of the Bogue Banks project. By May 1, 2004, at least three control stations and three monitoring stations will have been altered and two years of monitoring data, will not be collected or will be compromised for those sites. Those six sites are 40% of the sites to be sampled and 50% of the control sites. Monitoring of the Bogue Banks project has taken on higher significance due to the high shell content of much of the nourishment material. This material may require extended time for the beach to recover from making extended sampling critical. The impacts of the current project on this sampling should be addressed in the EA.

**Response:** Regarding monitoring, see response to comment 14 within the NMFS letter (5.05) dated June 5, 2003, above and the Environmental Commitments found in Section 9.0, below.

The schedule of monitoring for the "Bogue Banks Beach Restoration Project" (Department of the Army Permit #200000362) submitted by the Coastal Science Associates, Inc. indicates that Phase I sampling (Pine Knoll Shores to Indian Beach (including Salter Path)) will consist of two spring and fall post dredging analyses which **will end in November 2003 (emphasis added by the writer)**. The Bogue Banks Section 933 project will extend from Fort Macon to Indian Beach and is scheduled to begin construction on November 1, 2003. The Section 933 project will not impact the monitoring stations until after the Phase I monitoring has already been completed with two years post-disposal data collection. The three control sites located in Atlantic Beach, as part of the monitoring plan, will be impacted by the Section 933 project approximately in January of 2004 based on a dredging rate of 200 ft/day and a distance of about 10,140 ft from the start of disposal to the first control site. However, three additional control sites are located on the southern end of Emerald Isle which can continue to be used for the Phase II monitoring. These Emerald Isle control sites will be impacted by the final Phase III project, but Phase III construction has been delayed to the winter months of 2004 and 2005 and is contingent on the issuance of the required permits from NCDCM and USACE regulatory division for the proposed Bogue Inlet Channel Relocation Project.

While the locally preferred Section 933 will impact the three control locations in Atlantic Beach, the no action or base disposal plan, which already has agency approval and the required environmental clearances, would be implemented on November 1, 2003 if the 933 is not approved. The no action or base disposal plan would also impact these control locations in Atlantic Beach, but also not until the November 2003 sampling is complete. Portions of both Phase I and Phase II of the permitted local project contained material that did not match the existing beach conditions and concern of a longer infaunal recovery rate was evident. Monitoring by the IMS-UNC of Phase I of the Bogue Banks beach restoration project has compared the beach fill in Pine Knoll Shores and Indian Beach to control beaches in Emerald Isle. Post nourishment sampling has occurred at the ends of March, May, July and September. Prior to the proposed Section 933 project, two years of post disposal monitoring will have been recorded. The first post disposal monitoring documented a statistically significant decline in productivity of most animals with few signs of recovery after 5 to 8 months (Draft Fish and Wildlife Coordination Act Report Bogue Banks Shore Protection Project Carteret County, NC). Based on the historical literature, this type of impact is to be expected. Recent data collected March 2004, about one year later (one recruitment season) appear to indicate the recovery of several organisms after reduced numbers in March 2002, immediately following disposal activities, with some organisms exhibiting faster recovery rates than others. The primary recruitment period for macro invertebrate species on Bogue Banks is from May-September (Hackney, 1996; Diaz, 1980; Reilly and Bellis, 1978), therefore, it is expected that recovery will persist as sampling is conducted through September. Literature indicates that longer recovery rates can be expected with less compatible nourishment material (Hackney et al., 1996).

Monitoring performed by Coastal Science Associates, Inc., as a requirement of the Department of the Army permit #200000362, indicates a decline in the phylum's Mollusca and Arthropoda with large increases in the phylum Annelida. This appears to be consistent with previous beach nourishment studies in South Carolina (Van Dolah et al., 1994; P.C. Jutte et al., 1999). However, variability among and within transects makes this data difficult to interpret. The data were non-normally distributed and no non-parametric statistical tests for significance were performed, therefore, these data lack statistical validity. However, when subtracting control results normalizes the abundance data, the trend of declining mollusks and arthropods is reduced. When the data are normalized by subtracting the control results the impact is reduced to a 9% and 20% reduction, respectively. According to the Coastal Science Associates, Inc., (CSAi June 2002 B) first year post-disposal conclusions indicate that it is difficult to sort project impacts from the natural range of species diversity and abundance.

**Comment 6:** The possibility that a prolonged recovery period may be necessary for the Bogus Banks project indicates that further recovery time may be created by the additional nourishment in Pine Knoll Shores and Indian Beach. However, the initial recovery period may be reduced if the additional material is of better quality. Both of these possibilities should be examined in the EA.

**Response:** See our discussion on recovery times in our response to Comment 5, above as well as our response to Comments 2 and 3 in the Dr. Charles R. Peterson letter (5.18) dated May 28, 2003 (see below). See response to Comment 11: EFH Recommendations 3 within the NMFS letter (5.05) dated June 5, 2003, above, regarding compatibility.

**Comment 7:** Thank you for the opportunity to review and comment on the EA. DMF finds the EA inadequate unless it is amended as indicated.

**Response:** We have reviewed all the comments received on the EA and have modified the project description found in Section 2.0 of the FONSI. Based upon our review of these comments and investigations required to respond to NCDMF and other comments, we believe that the EA/FONSI is an appropriate document for the proposed action and it fully complies with NEPA.

**5.13 NCDENR; memorandum to Guy Pearce, Consistency Coordinator, dated June 6, 2003, from M. Ted Tyndall, NC Division of Coastal Management.**

**Comment 1:** The project is located on Bogue Banks in the communities of Atlantic Beach, Pine Knoll Shores, and Indian Beach (which includes Salter Path) and includes Fort Macon State Park. This office offers the following comments and recommendation on the subject project.

**Response:** Noted.

**Comment 2:** Brandt Island was previously pumped out back in 1986 and 1994. The material was placed onto the beaches of Atlantic Beach and Fort Macon. These projects were found consistent with the Coastal Management Program in late 1985 and amended in March of 1986. Then in early 1993; the DCM made a determination that the "base disposal area" covering some 6 miles of Atlantic Beach and Fort Macon remained consistent with the Coastal Management Program. Similarly, the area to be nourished under the authority of Section 933 includes over 7 miles of Pine Knoll Shores, Indian Beach and Salter Path, This is the same area that was authorized for beach nourishment under CAMA Major Permit #124-01 and most of which was completed.

**Response:** Noted.

**Comment 3:** Based on our review, this office would offer the following comments regarding the Draft Evaluation and Environmental Assessment. 1) On page EA-3, there is a statement that "beach-quality dredged material" must not have more than 10 percent fine sediment. This statement read in conjunction with the preceding statement on that page about the Coastal Management Program requiring beach-quality sand dredged from navigation channels not being permanently removed from the system is somewhat misleading. Currently, the Division of Coastal Management does not have any rules that reference a specific sand/silt percentage for beach deposition.

**Response:** We will remove any reference to the Division of Coastal Management having a specific sand/silt percentage for beach deposition in the FONSI.

**Comment 4:** 2) The document states that the towns of Atlantic Beach and Pine Knoll Shores will be responsible for surveying the first line of stable natural vegetation along the beach strand within their jurisdiction. By CRC rule, this line is the vegetation line that existed before commencement of the 1986 and 1994 projects. The division requests copies of these maps, preferably done as overlays on ortho aerial photographs.

**Response:** Noted. We have notified the towns of Atlantic Beach and Pine Knoll Shores of this requirement.

**Comment 5:** 3) The Division of Coastal Management would echo sentiments made by Jody Merritt, the Park Superintendent, in his February 2, 2002 letter regarding the importance of sand being placed on the recreation beach at the Fort. The Division of Coastal Management concurs that the beach access point near the western end of the Park should be a high priority for sand deposition. The sand pumped in front of the Port back in 2002 stopped short of this area leaving a very narrow useable beach at high tide.

**Response:** Noted. We plan to accommodate Fort Macon's request.

**Comment 6:** 4) The office would also request that if a consistency statement is issued that all commitments made in the EA, including those listed on page EA-52, be listed as conditions of that consistency,

**Response:** We agree to your request and have added to the commitments found in Section 9.0 of the FONSI. We plan to add the following commitment: Only beach compatible material will be placed on Bogue Banks from either the pumpout of Brandt Island or the maintenance dredging of the Morehead City Harbor navigation channels. We will include the following paragraph in the proposed Section 933 specifications, *"Materials: The dredging shall be accomplished so that the most suitable material available for beach disposal is placed within the prescribed section. Suitable materials shall be comprised of materials by ASTM D 2487 as SP, SP-SM, and SW. This material shall be predominantly of sand grain size with no more than 10% silt, shell, and clay material present. Should the dredge encounter materials not suitable for placement on the beach, the Contractor will be directed by the Contracting Officer to move to a more satisfactory location within Brandt Island or the navigation channels."*

**Comment 7:** Based on our review, it appears that the proposal is consistent with the North Carolina Coastal Management Program.

**Response:** Noted.

**5.14 NCWRC, memorandum to Ms. Melba McGee, Environmental Coordinator dated May 27, 2003, from Shannon Deaton, Section Manager, Habitat Conservation Section.**

**Comment 1:** Biologists with the North Carolina Wildlife Resources Commission (Commission) reviewed the Environmental Assessment (EA) with regard to impacts of the project on fish and wildlife resources. Our comments are provided in accordance with provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.) and the North Carolina Environmental Policy Act (G.S. 113A-1 et seq., as amended; 1 NCAC-25).

**Response:** Noted.

**Comment 2:** The United States Army Corps of Engineers (Corps) is proposing disposal of dredge material on Bogue Banks to replenish the eroding beaches and reduce the potential for storm damage. The Corps currently disposes of dredged material from the Brandt Island disposal site and Morehead City Harbor navigation channels along a 32,000' base disposal area extending from Fort Macon to Atlantic Beach. Under provisions of Section 933 of the Water Resources Development Act, the Corps, with cost-sharing support from Carteret County, is proposing extending the disposal area by 38,000' on beach along the towns of Pine Knoll Shores, Indian Beach, and Salter Path. If the Section 933 project is implemented, the existing base disposal area will receive 1.8 million cubic yards of material with a design berm width reduced from 150' to 30'. The Section 933 project area would receive approximately 4.5 million cubic yards of material to construct a design berm with a width of 30 feet and elevation of 7 feet. Project construction with pipeline and hopper dredges may begin November 16, 2003 and continue uninterrupted for up to 16 months. Hopper dredging would only be used in the Morehead City outer harbor from January 1 to March 31 of any year to minimize the potential take of sea turtles.

**Response:** See the revised project description found in Section 2.0 of the FONSI. The revised construction window is from November 1, 2003 to April 30, 2004 (to May 31, 2004, if required) and no pumping of material on the beach after May 31, 2004. No change is proposed for the hopper dredges (January 1, 2004 to March 31, 2004).

**Comment 3:** The proposed Section 933 project is inconsistent with our *Policies and Guidelines for Conservation of Wetlands and Aquatic Habitats*. The Commission recognizes that beach renourishment is sometimes necessary to counteract erosion that threatens developed coastal areas. However, renourishment should be conducted in a manner that minimizes direct, adverse impacts on wildlife resources and their habitat. Avoidance of critical nesting or foraging periods used to minimize impacts on wildlife resources and beach or dune construction activities during these critical periods should only be conducted when human health and safety are in eminent danger. Beach renourishment conducted from 2001 to 2002 along the Section 933 project area has largely precluded the urgency to conduct additional beach disposal during recommended moratoriums.

**Response:** We agree that the proposed Section 933 should be conducted in a manner that minimizes the direct adverse impacts to wildlife resources and their habitat. That is why we have revised the project description found in Section 2.0 of the FONSI. No year round dredging is proposed and the pumping of beach quality material on the beach will not extend past May 31, 2004. The majority (up to 86%) of the proposed Section 933 would be completed before the peak intertidal macrofauna recruitment time periods on Bogue Banks, from May to September (Hackney et al., 1996; Diaz, 1980; Reilly and Bellis, 1978).

Additionally, the environmental commitments found in Section 9.0 of the FONSI, will also minimize the impacts to wildlife resources and their habitat.

As indicated in Section 1.02 of the EA and the Coastal Analysis Appendix found in the Draft Evaluation Report (page Appendix C-24), states "phase 1 of the local nourishment project resulted in the placement of approximately 1.73 million cubic yards of material on Pine Knoll Shores to Indian Beach, a distance of 39,202 feet. The berm-only project averaged less than 45 cubic yards per foot, which is a very small beachfill." Table 1-1 in the EA provides maximum quantities (cubic yards per foot) for both the Section 933 and the base disposal plan. The average maximum sediment disposal rate (cubic yard per foot) is 88 for

Fort Macon, 49 for Atlantic Beach, 124 for Pine Knoll Shores, and 105 for Indian Beach (including Salter Path). The local nourishment project did not preclude the urgency to conduct the proposed Section 933 project (see Coastal Analysis Appendix found in the EA).

**Comment 4:** The Commission has the following additional comments and concerns regarding impacts of the proposed project on fish and wildlife resources and recommended mitigation strategies for those impacts:

Sea Turtle and Shorebird Impacts. The Commission disagrees with the inference that beaches on Bogue Banks are suitable for only loggerhead (*Caretta caretta*) turtles. In fact, during the 2000 nesting season, there was a confirmed green (*Chelonia mydas*) turtle nest on Bogue Banks and habitat there is also suitable for leatherback (*Dermochelys coriacea*) turtles. Given that nesting by both leatherbacks and green turtles has sharply increased in the last 10 years in the Southeastern United States, and North Carolina represents the northern limit of nesting for both of these species, increased nesting in the state in the near future would not be unexpected. Therefore, Bogue Banks must be considered suitable nesting habitat for loggerheads, as well as greens and leatherbacks.

**Response:** There is no inference in the EA that the beaches at Bogue Banks are **only** suitable for loggerhead sea turtles. However, our discussions with Matthew H. Godfrey and Nicole A. Mihnovets indicate that the majority of nesting sea turtles at Bogue Banks are loggerheads. We also agree that green, as well as leatherbacks may nest on Bogue Banks since we indicated in our Biological Assessment (Attachment D of the EA) that, "It has been determined that the project, as currently proposed, may affect the piping plover, **green sea turtle, loggerhead sea turtle, hawksbill sea turtle, leatherback sea turtle, Kemp's ridley sea turtle (emphasis added by the writer),** and seabeach amaranth."

**Comment 5:** Restricting hopper dredging between January and March is appropriate because water temperatures are cool and sea turtle abundance is likely to be lowest. However, as experienced with other similar projects, anticipated schedules are sometimes delayed, which places sea turtles at substantial risk. Therefore, the Commission feels that contingency sea turtle protection plans need to be prepared including anticipatory trawling to remove any turtles in the project area.

**Response:** By letter dated, June 13, 2003, National Marine Fisheries Service (NMFS) has informed us that if the hopper dredges comply with the 1997 Regional Biological Opinion (RBO) for the Continued Hopper Dredging of Channels and Borrow Areas in the Southeastern United States that we would not adversely effect sea turtles. The 1997 NMFS RBO has no hopper dredging window, however the Corps of Engineer, South Atlantic Division and the Wilmington District Protocols indicate that for Morehead City Harbor, hopper dredging can only be conducted from 1 January to March 31 of any year. See response to comment 3 within the NMFS letter (5.04) dated June 13, 2003, above.

**Comment 6:** In addition to in-water measures, if renourishment occurs during the sea turtle nesting season, sufficient time must be provided on a daily basis to allow volunteers/monitors to locate at-risk nests for subsequent relocation. The Commission recommends a no-work window until 10 am each day during the nesting season to ensure sufficient time to get any nests off the beach, and also to locate any turtles that nest late into the night and do not return to the ocean until around sunrise. Effective communication between the monitors and the dredge workers is essential to these mitigation efforts.



**Response:** We disagree. We believe that the established sea turtle nest monitoring and relocation protocol provides adequate protection of these species. Moreover, requirements for Section 7 of the Endangered Species Act of 1973, as amended have been met. The project is covered under a USFWS Biological Opinion dated July 22, 2003 and a NMFS Regional Biological Opinion dated 1997. All reasonable and prudent measures, as well as all terms and conditions of the USFWS Biological Opinion dated July 22, 2003 (see Appendix 2) and the NMFS Regional Biological Opinion dated 1997 (see letter dated June 13, 2003 from NMFS found in Appendix 2) will be complied with. Therefore the proposed action will not adversely effect sea turtle nesting within the project area. Additionally, the daily active beach construction zone averages about 200 feet. That means the bulldozers and the spreader (i.e., the end of the discharge pipe) will be actively working within the daily 200-foot section of beach. It is unlikely that a sea turtle would attempt to nest in the 200-foot long construction zone that has that much activity (i.e., lights for the safety of the workers, bulldozers, flowing water, etc.). The remainder of the beach would be available for sea turtle nesting purposes. Also, this proposal would dramatically increase costs and create an unacceptable delay in the completion of the proposed Section 933.

**Comment 7:** The Commission is encouraged by the prospect that the material proposed for placement on the beaches might be more suitable material than that placed by previous renourishment work on Bogue Banks. However, recent work also resulted in the placement of incompatible materials on the beach despite extensive pre-project sediment quality testing of the source areas. Therefore, the Commission feels that, in addition to thorough testing of the dredge and pumpout areas, a inviolate protocol for monitoring, communicating, and responding to any unforeseen placements of incompatible material on the beach should be implemented for any Section 933 project on Bogue Banks.

**Response:** See response to Comment 11: EFH Recommendations 3 within the NMFS letter (5.05) dated June 5, 2003, above regarding compatibility.

The proposed Section 933 action is a civil works project and therefore Corps' inspectors will be assigned to monitor the hydraulic dredge, pipeline route, booster pumps (if required), and placement sites on the beach. These inspectors review the ongoing work for safety, as well as making sure that the contractor complies with all conditions (found in the plans and specifications) of the contract. We will include the following paragraph in the proposed Section 933 specifications, *"Materials: The dredging shall be accomplished so that the most suitable material available for beach disposal is placed within the prescribed section. Suitable materials shall be comprised of materials by ASTM D 2487 as SP, SP-SM, and SW. This material shall be predominantly of sand grain size with no more than 10% silt, shell, and clay material present. Should the dredge encounter materials not suitable for placement on the beach, the Contractor will be directed by the Contracting Officer to move to a more satisfactory location within Brandt Island or the navigation channels."* If problems occur during construction anywhere along the pipeline route or if the contractor is not abiding by the conditions of the contract (i.e., pumping material to the beach that is not suitable), these Corps inspectors would immediately notify the Contracting Officer (CO) located at the District office and the CO would direct the contractor to move the dredge to a more suitable site in Brandt island or the navigation channels.

**Comment 8:** Several factors would counteract the perceived benefit of additional disposal of more compatible material so soon after the previous renourishment project. The EA states, "migratory shorebirds may use the project area for foraging and roosting

habitat, but would not be adversely affected by the proposed action." While the beachfront of Bogue Banks does not support much nesting habitat because of the extensive development, some nesting by Wilson's plovers (*Charadrius wilsonia*), willets (*Catoptrophorus semipalmatus*) and American oystercatchers (*Haematopus palliatus*) may still occur on wider beach stretches and migratory shorebirds such as sanderlings (*Calidris alba*) and ruddy turnstones (*Arenaria interpres*) do forage and roost in the project area. Any depletion of the prey base could certainly have a negative affect on these latter bird species. The pumping of sand onto the beach covers and depletes invertebrate resources and successive burial, as would be the case for Indian Beach and Pine Knoll Shores, greatly delays recovery. Further, renourishment during the months of March through May is particularly destructive since this is the primary recruitment period for most beach macroinvertebrates. The EA also mentions a recent year-round study of shorebird use in Brunswick County, North Carolina (USACE 2002). Although this report indicated that beach nourishment had "no measurable impact on bird use during the first year of monitoring," it was also concluded that "...the power for all statistical comparisons regarding the effects of renourishment was generally low, indicating that additional surveys or data will be required prior to confident conclusions."

**Response:** The primary recruitment period for macro invertebrate species on Bogue Banks is from May-September (Hackney, 1996; Diaz, 1980; Reilly and Bellis, 1978), not March through May. See our response to comment 2 in Dr. Charles H. Peterson letter (5.18) dated May 28, 2003, below regarding depletion of the prey base (i.e., beach macroinvertebrates) for shorebirds. The recent year-round study of shorebird use in Brunswick County (USACE 2002) quoted in the EA and in your comment was the first year report of the study. The second year report has been completed and is located at <http://www.saw.usace.army.mil/wilmington-harbor/main.htm> under Monitoring Reports. The results of the second year report (USACE 2003), Section 5.0 Summary, page 18 states "Despite the potential for community changes at renourished beaches, in this study, beach renourishment was not found to alter the overall abundance or species richness of waterbirds and shorebirds. A clear renourishment effect was not evident for individual species either, including willet and sanderling, which are heavily dependent on beach habitat. Moreover, examination of weekly survey data revealed no consistent short-term changes in abundance or species richness in the weeks following beach renourishment". These results should be applicable to Bogue Banks.

**Comment 9:** Since renourishment would deplete beach macro invertebrate populations, particularly if conducted during the primary recruitment period, the Commission recommends implementation of a restocking program for coquina clams and/or mole crabs to accelerate recovery from any Section 933 project. This program could either involve collection at the project site before spoil placement or possibly the use of cultured sources of these invertebrates.

**Response:** See response to Comment 8, above regarding depletion of the prey base (i.e., beach macroinvertebrates) for shorebirds. As indicated in Section 9.0 of the FONSI, to the maximum extent practicable and during the warmer months, we will try to reduce direct impacts to intertidal macrofauna by relocation to completed portions of the beach.

**Comment 10:** In addition to impacts on macro invertebrate resources and waterbirds, the new spoil material may adversely effect sea turtle nesting. For example, the disposal may alter the thermal environment during incubation, and hence alter the sex

ratios of the hatchlings produced by eggs laid there in future years. Similarly, turtle nests moved from the work area may experience different temperatures in their relocated positions. If such measures are implemented, the Commission recommends that dataloggers be purchased to not only monitor sand temperatures both pre and post project, but also nest temperatures of relocated nests. The Commission has some dataloggers for Atlantic Beach to Bogue Inlet, but more (approximately 20) are needed to monitor sand temperatures of the beach in Fort Macon and also nest temperatures of any nests that are relocated because of a Section 933 project.

**Response:** See response to Comment 6, above regarding the project adversely effecting sea turtle nesting. As indicated, requirements for Section 7 of the Endangered Species Act of 1973, as amended have been met. On May 9, 2003, the Wilmington District provided funds via USFWS to NCWRC for the purchase of Hobo H8 dataloggers, a Munsell soil color chart, and a soil compaction meter for the monitoring of sand temperatures in Atlantic Beach. On July 31, 2003, we again provided additional funds via USFWS to NCWRC for the purchase of dataloggers to monitor sand temperatures both pre and post project and for nest temperatures of relocated nests.

**Comment 11:** Brandt Island Habitat: Brandt Island is a site of extraordinary nesting numbers of North Carolina's highest priority migratory bird species. In particular, as many as 576 pairs of common terns (*Sterna hirundo*) have nested on the site with as many as 182 pairs of black skimmers (*Rynchops niger*), 175 pairs of state threatened gull-billed terns (*Sterna nilotica*) and 90 pairs of least terns (*Sterna albifrons*). In comparison, the entire nesting population of these four species in North Carolina based on the last statewide census is as follows:

common tern = 1131 nests  
black skimmer = 594 nests  
gull-billed tern = 258 nests  
least tern = 1742

Clearly, Brandt Island is very important to these four colonial nesting species, although habitat quality there is declining because of tall vegetation and increased predator populations. However, other priority species such as Wilson's plovers and American oystercatchers nest on the site each year regardless of the mammalian predators that have managed to populate the area.

**Response:** We agree that Brandt Island has provided valuable habitat for waterbirds, but according to the NC Colonial Waterbird Program Data Base developed and maintained by NCWRC, the last time 576 nests of common terns and 182 nests of black skimmers occurred on Brandt Island was in 1983 and 1977, respectively. This same database indicates that in 1983 the total nests on Brandt Island was 855 and in 1988 there was a total of 9 nests (Black skimmer-2 nests, Common tern-5 nests, and Gull-billed tern-2 nests). Results since then indicate that Brandt Island has been surveyed, but the numbers of nests and/or types of waterbirds are not mentioned in the NC Colonial Waterbird Program Data Base.

**Comment 12:** While pumpout of Brandt Island during the nesting season is strongly discouraged, if it does occur, measures should be taken to mitigate for the disturbance. Given the ephemeral nature of waterbird nesting habitat there, we feel it is imperative that pumpout activities be done in a way consistent with the continued use of

this site by nesting waterbirds. This will entail a simple modification of the pumpout activities so that a small isolated island is retained with the remaining 5-10 acres in a dome (less than 15 feet above mean high tide) of primarily sand and shell that is void of heavy grass or shrubs. The island should be separated from remaining disposal areas with at least 100 yards of deep water. Whether or not the Section 933 project is implemented, the base plan could also implement the pumpout activities to isolate the nesting island.

**Response:** Brandt Island is owned and used as a sand recycling site by the North Carolina State Ports Authority (NCSPA) and is dedicated for the purpose of dredged material disposal. In 1986 and 1994, Brandt Island was pumped out and the resultant material was placed on Bogue Banks. The Corps' most current survey of the approximately 96-acre Brandt Island indicates that top of dike averages about 40 feet above mean sea level. The height has increased the effects of wind blown sand, which destroys nests, and the islands' size enables predators to survive year round. Additionally, as you indicated in Comment 11, the habitat quality is declining due to tall vegetation and predation.

As indicated in the EA, the pumpout of Brandt Island will be initiated on November 1, 2003, whether or not the Section 933 is funded. If the proposed action extends into the waterbird nesting season (1 April to August 31 of any year), we will work with representatives of NCWRC to reduce impacts to nesting waterbirds. Over the years, the Corps has worked with NCWRC, Audubon Society and other agencies to protect and restore waterbird habitat. Wainwright Island, Battery Island, Ferry Slip Island, and Pelican Island are examples of the Corps' commitment to this principle.

We cannot agree to create a 5 to 10 acre dome of sand separated by 100 yards of deep water on Brandt Island. By creating this island, the dredge material capacity of Brandt Island would be severely reduced for Morehead City Harbor. By reducing the capacity of Brandt Island, this could possibly mean more frequent pumpouts to Bogue Banks. Lastly, we do not own the island and cannot make any commitments on NCSPA's property.

However, the Corps is proposing to construct the 61-acre Environmental Sustainable Confined Disposal Facility (ESCDF) near Pelletier Creek, off Bogue Sound, in Morehead City. About 21 acres of the ESCDF would be upland and we could consider using a portion of the area for colonial waterbird habitat. Of course, that decision would be contingent upon the topographic area, elevation, etc., of the proposed ESCDF.

**Comment 13:** Since Brandt Island serves as habitat for an undescribed skipper, the Commission believes that surveys and subsequent monitoring for this species are appropriate. Information is needed about this species to assess the impacts of the proposed Brandt Island pumpout, and possibly the subsequent mitigation efforts to create more suitable shorebird habitat.

**Response:** On June 16, 2003, representatives of Corps, USFWS, NC Natural Heritage Program and NCSPA met on Brandt Island to discuss this matter. The purpose of this meeting was to observe and discuss habitat management options that may be viable on Brandt Island and surrounding islands for the host plant Seaside Little Bluestem (*Schizachyrium littorale*) and the "Banks Skipper" (*Atrytonopsis* sp.). The U.S. Fish & Wildlife will be requesting a meeting of stakeholders to discuss long-term habitat management strategies. At a minimum, this meeting would include the USACE, USFWS, Natural Heritage, NCSPA, NC Parks and Coastal Management. Both the USACE and the NCSPA stated they were willing to "come to the table and discuss potentials" for

addressing the USFWS concerns regarding habitat management of the host plant and "Banks Skipper". We may meet in September 2003, to discuss these issues.

**Comment 14:** Additional Shorebird Mitigation. There are some opportunities to protect the West Point near Bogue Inlet as mitigation for foraging area losses, and perhaps nesting habitat losses, attributable to the Section 933 project and Brandt Island pumpout. These measures include year-round posting of mud/sand flats, a year-round leash law for dogs, no driving on the spit and a ban on fireworks and kites. The Commission believes that the magnitude of the proposed project warrants these mitigation efforts.

**Response:** The project does not warrant mitigation beyond that indicated in the EA. We believe from our review of the existing data (see response to comment 2 in Dr. Charles H. Peterson letter (5.18) dated May 28, 2003), that the proposed action will not adversely effect foraging area habitat for shorebirds. Additionally, if the Section 933 is funded, the majority (perhaps up to 86%) of the proposed Section 933 would be completed by April 1, 2004 (see response to Comment 3, above). If the Section 933 project is not funded, the base disposal plan may be completed at or before April 1, 2004, which should not adversely impact nesting habitat.

**Comment 15:** The Commission believes year-round bird monitoring on the beach as well as Brant Island should be implemented.

**Response:** A recent year round study in Brunswick County, NC documents in detail shorebird use there (USACE 2002). This report indicated that beach nourishment had no measurable impact to bird use during the first year of monitoring. The second year report has been completed and is located at <http://www.saw.usace.army.mil/wilmington-harbor/main.htm> under Monitoring Reports. The results of the second year report (USACE 2003), Section 5.0 Summary, page 18 states "Despite the potential for community changes at renourished beaches, in this study, beach renourishment was not found to alter the overall abundance or species richness of waterbirds and shorebirds. A clear renourishment effect was not evident for individual species either, including willet and sanderling, which are heavily dependent on beach habitat. Moreover, examination of weekly survey data revealed no consistent short-term changes in abundance or species richness in the weeks following beach renourishment". These results should be applicable to Bogue Banks.

**Comment 16:** Based on the preceding concerns, the Commission feels that a Finding of No Significant Impact for the proposed project is not appropriate and that an Environmental Impact Statement should be prepared. The Commission appreciates the opportunity to comment on the impacts of the project on fish and wildlife resources.

**Response:** We have reviewed all the comments received on the EA and have modified the project description found in Section 2.0 of the FONSI. Based upon our review of comments and investigations required to respond to your and other comments, we believe that the EA/FONSI is an appropriate document for the proposed action and it fully complies with NEPA.

By memorandum dated July 16, 2003, NCWRC commented on the Draft Unsigned FONSI. NCWRC had the same issues indicated in their earlier letter dated May 27, 2003 (i.e., construction window, cumulative impacts, recovery of macro invertebrates, impacts to shorebirds, etc.) These issues are addressed above. NCWRC wanted the Corps to

consider waterbird nesting habitat on the proposed 61-acre Environmental Sustainable Confined Disposal Facility (ESCDF) near Pelletier Creek, off Bogue Sound, in Morehead City.

The ecologically sustainable confined disposal facility (ESCDF), which is under consideration for development in Bogue Sound near Pelletier Creek is anticipated to provide several categories of environmental enhancement benefits. Components of the plan will continue to be coordinated with other agencies prior to its finalization, so that habitat value can be included for the resources of greatest concern. However, no commitments can be made to the proposed Section 933 project with regard to the proposed ESCDF, because it would be a part of the Atlantic Intracoastal Waterway (AIWW) project. Its funds, management, and commitments would all be linked to the AIWW project, and it cannot bear commitments on behalf of other Federal projects. As indicated during our inter agency meeting on June 24, 2003, a representative from Carteret County stated that they would continue monitoring the Phase 1 area (Pine Knoll Shores to Indian Beach (including Salter Path)) beyond November 2003, if adequate recovery of mole crabs and coquina clams does not occur. If required the monitoring would be extended to November 2004. Please note if the Section 933 project is not funded, Carteret County will not extend the monitoring until November 2004.

**5.15 Memorandum to Jim McRight, Public Water Supply from Patti Fowler, Shellfish Sanitation and Recreational Water Quality Section dated May 20, 2003.**

**Comment:** The Shellfish Sanitation and Recreational Water Quality Section would have no objection to the above mentioned project provided that beach disposal occurs only between November 1 and April 30, when recreational usage is low and that clean sand is used and not dredged sand from closed shellfishing areas. If beach disposal was to occur at times other than stated above or if sand from a closed shellfishing area is to be used, a swimming advisory may be posted and a press release may be made. Please notify this office when such disposal occurs.

**Response:** As indicated in Section 9.0 of the FONSI, entitled Environmental Commitments, number 6 states "Within Morehead City Harbor, some of the navigational channels are closed to shellfish harvesting. By Memorandum dated January 31, 2002, from the North Carolina Department of Environment and Natural Resources, Division of Environmental Health, Shellfish Sanitation and Recreational Water Quality Section (see Attachment B of the main report), if maintenance material is excavated from these closed shellfishing areas between May 1 and October 31 and placed on Bogue Banks a swimming advisory will be posted and a press release made. The Wilmington District will notify the Shellfish Sanitation and Recreational Water Quality Section prior to dredging from a closed shellfishing area with placement on a recreational swimming area."

**5.16 Memorandum to Ms. Melba McGee, Environmental Coordinator from Guy C. Pearce, Consistency Coordinator dated June 5, 2003.**

**Comment:** The subject project is currently under a consistency review by the Division. Our office will make comments on the proposed project during consistency determination. If you have any questions, or wish to discuss this matter further, please contact me at (919) 733-2293, ext.249. Thank you.

**Response:** Thank you for your help in this matter.

**5.17 Checklist from the Wilmington Regional Office, NCDENR dated May 23, 2003.**

**Comment:** The Sedimentation Pollution Control Act of 1973 must be properly addressed for any land disturbing activity. An erosion & sedimentation control plan will be required if one or more acres to be disturbed. Plan filed with proper Regional Office (Land Quality Section) at least 30 days before beginning activity. A fee of \$40 for the first acre or any part of an acre.

**Response:** The District will file the required erosion & sedimentation control plan with the proper Regional Office (Land Quality Section) at least 30 days before beginning activity.

**5.18 Letter to Chrys Baggett from Dr. Charles H. Peterson, Professor of Marine Sciences, University of North Carolina at Chapel Hill, letter dated May 28, 2003.**

**Comment 1:** I write in response to my review of the EA for the deposition of dredged materials on 13 miles of the Bogue Banks beaches as part of a proposed 933 project. I serve as a member of the NC Environmental Management Commission, the Chair of the Water Quality Committee, a member of the Inter-commission Team on Coastal Habitat Protection Plan for fisheries, a member of the Science Panel on Coastal Hazards for the NC Coastal Resources Commission, and a two-term former member of the NC Marine Fisheries Commission. I also am professor of marine ecology at UNC, with extensive experience on sand beach ecology. Thus I have both management and scientific experience and expertise.

**Response:** Noted.

**Comment 2:** The EA is so grossly inadequate in its failure to treat cumulative impacts as to be in full violation of NEPA at the federal level and its state counterpart. Specifically, the beaches of Pine Knoll Shores, Salter Path, and part of Indian Beach were already nourished in winter 2001-2. The benthic biological communities of the beach and the shorebirds that utilize them as vital prey have not yet recovered from that event that occurred over one and a half years ago. I have data on this absence of recovery that I am happy to share and have shared with federal and state agencies from an ongoing monitoring project that we are conducting under Sea Grant funding. This EA violates NEPA and the state counterpart in the area of cumulative impacts in two ways. First, there is no mention and analysis of the cumulative impacts issue. So there is a procedural violation. Second, the available information known to the USACE and to DENR from our research on the last nourishment is not used to construct a credible evaluation of how a second perturbation will affect the beach ecosystem and its ecosystem services to fish and wildlife before recovery from the first one has even occurred. The spatial issue of cumulative impacts also needs attention because the majority of the western end of Bogue Banks has also been nourished and our data show that this project has had a huge impact on the benthic invertebrates and vertebrate consumers as of the present

date. Many of these species would normally help in recovery of eastern Bogue Banks through migration but cannot because they are depleted in the potential source area. Both temporal and spatial aspects of cumulative effects are utterly ignored in this EA.

**Response:** Attachment E found in the EA contains the Corps' Cumulative Impact Assessment (CIA), which follows the 11-step process outlined by the Council on Environmental Quality (CEQ) in their 1997 publication Considering Cumulative Effect Under the National Environmental Policy Act. Additionally Section 5.14 of the EA summarizes the CIA and refers to the cumulative analysis of existing, proposed, and potential project involving the placement of sand material on the beach and directs the reader to Attachment E of Draft Evaluation Report. The CIA also addresses the three-phase local beach nourishment project. Moreover the CIA considers known past, present and the reasonably foreseeable future, sand placement on a statewide and project vicinity (i.e., Bogue Banks) scale over a 50-year period of analysis from 1965 to 2015. The EA complies with all NEPA requirements.

The Corps has requested and reviewed the data collected by Dr. Charles Peterson and Associates at IMS-UNC. The data lacks statistical analyses and is therefore difficult to interpret scientifically. Without an evaluation of the data under statistical scrutiny, it is not possible to separate variability among and within transects and spatial and temporal variability. Therefore, it is difficult to make any sound scientific conclusions about disposal impacts on macro invertebrate populations. However, what can be interpreted based on the data presented is presence or absence of organisms in the different site locations.

The data are collected in two month increments throughout one recruitment season immediately following Phase I impacts at Pine Knoll Shores (November 2001-April 2002) with the addition of March 2003 data and the figures are grouped into with and without Bear Island as a control. Those figures that included Bear Island as a control were not included in the analysis since no beach scraping or other manipulation has ever occurred on this island. To better understand pre- and post-project impacts on Bogue Banks, the Corps believes that the control transects should be located on the same beach which has been subject to similar historical dynamics.

The Corps has evaluated the data with respect to recruitment periods in order to provide a more representative assessment of post-disposal organism presence. The recruitment period for macro invertebrate populations on Bogue Banks, North Carolina is from May-September with peak recruitment occurring from July-September (Hackney et al., 1996; Diaz, 1980; Reilly and Bellis, 1978). As indicated in the literature, based on these recruitment periods and the data that has been collected by Peterson thus far, there has only been one complete recruitment period within the 1.5-year timeframe. Literature dating back to the early 1970's along the southeast coast indicate that opportunistic infauna species (ex. *Emerita* and polychaetes) found in the nourished areas are subject to direct mortality from burial, however, recovery often occurs between 1 to 3 years depending on sediment compatibility and the relationship of nourishment placement to recruitment timeframes (Hayden and Dolan, 1974; Saloman, 1984; Nelson, 1989; Van Dolah et al., 1992; Van Dolah et al., 1993; Hackney et al. 1996; P.C. Jutte et al., 1999).

Sediment compatibility will affect species differently depending on the grain size and sorting characteristics. *Emerita* may be negatively impacted by the introduction of finer grained sand while polychaete populations may increase (Hackney et al, 1996). The increase in fast growing opportunistic species such as polychaetes is often evident immediately



following nourishment (Coastal Science Associates, Inc.; C.H. Peterson, IMS-UNC; P.C. Jutte et al., 1999). Species that require a longer growing season may require a longer recovery period. The material placed on Bogue Banks during the permitted "Bogue Banks Beach Restoration Project" contained high shell content and was cited by the North Carolina Division of Coastal Management for "incompatibility". Though the material placed on the beach differs from the existing conditions of Bogue Banks, there does appear to be a presence of organisms in the nourished area after one recruitment season indicating signs of partial recovery (C.H. Peterson, IMS-UNC; Coastal Science Associates, Inc.). Review of the vibricore samples taken by the U.S. Army Corps of Engineers from the Morehead City inner harbor indicate that the material dredged from the inner harbor channels is compatible with the native beach material (see response to Comment 11 EFH Recommendations 3 within the NMFS letter (5.05) dated June 5, 2003, above). Potentially, the placement of material that is more representative of the native beach conditions onto Bogue Banks would improve the recovery time of the macrobenthic community and potentially improve the current "incompatible" conditions (C.H. Peterson Personal communication).

Though the biological communities exhibited decreased abundances immediately following nourishment and have not yet fully recovered, when including data for one complete recruitment season, these data appear to indicate at least partial recovery in both *Donax* and *Emerita*. *Donax* appear to be impacted immediately following disposal when compared to the control locations. Though numbers are low, it is important to mention that *Donax* were present throughout the recruitment period and by March 2003 are similar in numbers to the control transects. The data appear to indicate that *Donax* are recovering to near control levels after one recruitment season; however, the recovery process is slower than other organisms. *Emerita* also appear to be impacted immediately following disposal with lower numbers per transect compared to the control. However, during and after the recruitment period, *Emerita* numbers in the disposal transects surpassed the control. Finally, the new data from March 2003 indicate equal numbers of *Emerita* in both nourished and control areas. Amphipods exhibited reduced numbers after disposal, and after one year numbers per transect were still low. However, control numbers show evidence of a six-fold decrease from March 2002 to March 2003 possibly indicating that other factors may be effecting amphipod numbers. Ghost crab burrow counts are reduced in the nourished transects consistently throughout the year; however, they are present throughout all sampling months. The shorebird data indicate similar trends to the macro invertebrate data in that there appears to be reduced numbers immediately after disposal. Though numbers of feeding shorebirds are still reduced by about half of the control numbers in May 2003, it appears that feeding shorebirds are in the process of recovering after considerable reductions immediately following the project in March of 2002. Based on the review of Peterson's data collected on Bogue Banks, several organisms appear to be recovering after reduced numbers in March 2002 immediately following disposal activities with some organisms exhibiting faster recovery rates than others.

Additional monitoring performed by Coastal Science Associates, Inc., as a requirement of the Department of the Army permit #200000362, indicates a decline in the phylum's Mollusca and Arthropoda with large increases in the phylum Annelida. This appears to be consistent with previous beach nourishment studies in South Carolina (Van Dolah et al., 1994; P.C. Jutte et al., 1999). However, variability among and within transects makes this data difficult to interpret. The data were non-normally distributed and no non-parametric statistical tests for significance were performed, therefore, these data lack statistical validity. However, when subtracting control results normalizes the abundance data, the trend of declining mollusks and arthropods is reduced. When the data are normalized by

subtracting the control results the impact is reduced to a 9% and 20% reduction respectively. According to the Coastal Science Associates, Inc., (CSA June 2002) first year post-disposal conclusions indicate that it is difficult to sort project impacts from the natural range of species diversity and abundance.

After review of the data presented by Dr. Charles H. Peterson and associates at IMS-UNC and Coastal Science Associates, Inc., the Corps agrees that impacts from the permitted project are evident; however the length of time for recovery of the benthic invertebrates and vertebrate consumers are not outside of what was expected according to the historical literature. Partial recovery after 1 year indicates that organisms are in the process of recovering to pre-project conditions.

**Comment 3:** In addition to ignoring cumulative impacts of multiple beach nourishment projects within a 2+year period, the EA fails to evaluate the known impacts of previous beach nourishments on Bogue Banks. Bogue Banks has relatively little long-shore transport and perhaps for that reason has slow recolonization and recovery rates of beach invertebrates. Transport and immigration of beach invertebrates is not achieved over long distances under low longshore transport conditions. The failure to recover promptly creates important impacts on fisheries habitat in direct contradiction to the NC Fisheries Reform Act of 1987 and its focus on enhancing fisheries habitat through the CHPP process. This impact is especially serious for Florida pompano, Gulf kingfish, and flounders, all of which use the surf zone and, beach invertebrate prey as primary nursery. The EA claim of perhaps as short as two months until recovery is unrealistic in light of known durations of impact from previous Bogue Banks nourishments.

**Response:** See response to comment 2 (above), regarding cumulative impacts. The Corps is not aware of any literature indicating slow recolonization and recovery rates of beach invertebrates as a result of little long-shore transport on Bogue Banks. In addition, long-shore transport is not the only method of transport for recolonization. Short-term wave action and wind driven currents will also play a large role in transport and immigration of beach invertebrates. Though it is understood that immediately following disposal there is a potential for loss of intertidal macrofauna, it appears that the presence of organisms on Bogue Banks begins within months after disposal ceases and the recovery process continues through year one post nourishment impacts. According to Reilly and Bellis (1978), recovery should occur within one or two recruitment seasons following the project. After one complete recruitment season, the data that have been collected by Peterson and Coastal Science Associates, Inc. on Bogue Banks indicate organisms recovering with an increasing number of recruitment time frames. It can be expected that as this population of macro invertebrates continues to increase, the impacts on surf zone fish species, which use this prey base, will be minimized. Ross and Lancaster (2002) found site fidelity exhibited by Florida Pompano and Gulf Kingfish indicating that disturbances could impact behavior or survival of juvenile fishes in the surf zone. According to the New York District's Biological Monitoring Program for the Atlantic Coast of New Jersey, Asbury Park to Manasquan Section Beach Erosion Control Project (USACE 1999), analysis of the first post-nourishment year of monitoring did not reveal any long-term impacts to surf zone finfish distribution and abundance patterns.

**Comment 4:** Finally, the plan for 16 months of continuous project activity through the biologically productive warm months violates the tenets of minimization and avoidance in environmental management. Such a plan is certain to pose higher impacts on habitat usage and recruitment of surf fish and shorebirds. There is no justification

except financial and the only reason it is cheaper is that no mitigation is proposed. All the costs to public trust resources are externalized so as to create a false economy. If summertime activity is desired, then proper habitat mitigation should be included. Project activity in summertime will also have a large economic impact on the hotel, hospitality, and tourism business on Bogue Banks, an impact not addressed in the EA and not compensated for in the plan.

**Response:** We have revised the project description for the proposed Section 933 found in Section 2.0 of the FONSI. The revised construction window is from November 1, 2003 to April 30, 2004 (to May 31, 2004, if required). Economic issues are addressed in Appendix D of the Draft Evaluation Report and in our responses to Dr. Douglas J. Wakeman's letter (5.23) dated June 2, 2003 and NCCF's letter (5.21) dated June 2, 2003.

**5.19 Bogue Banks Environmental Stewardship Corporation (BBESC), letter dated May 16, 2003.**

**Comment 1:** Please have someone on your staff review the attached comment to the United States Army Corps of Engineers (USACE). The Port of Morehead City, N.C., Beaufort Inlet, ***EVALUATION AND ENVIRONMENTAL ASSESSMENT REPORT***. I am submitting this comment on behalf of our membership to the Wilmington District, United States Army Corps of Engineers.

**Response:** Noted.

**Comment 2:** Permitting and funding of this project are essential to preserve one of North Carolina's oldest and most precious natural resources: Bogue Banks. If you have questions, please contact me at 252-747-2911 or at home 252-522-4229.

**Response:** Noted.

**Comments on the USACE 933 Project, dated May 12, 2003**

**Comment 3: Introductory Remarks:**

The *BBESC* was incorporated in June of 2001. The membership consists of 281 homeowners along Bogue Banks. The goal of our organization is simple:

*We are seeking a similar sand management system used by the **United States Army Corps of Engineers** (USACE) to maintain Wilmington Harbor and Cape Canaveral Harbor in Florida to be put into practice at Morehead City Harbor. Sand presently being removed from the littoral system by USA CE in maintenance of Beaufort Inlet and dumped at sea must be put on adjacent beaches*

In a meeting requested by the *BBESC* and held in Raleigh in August of 2002, representatives from the *Department of Environment and Natural Resources*, including the *Department of Water Resources* and the *Department of Coastal Management (DCM)*, along with representatives from the USACE Wilmington District, Mr. Aiken was requested to consider a maintenance project for Beaufort Inlet that would combine outer and inner harbor sediment disposal practices in which spoils could be distributed along adjacent beaches west to Indian Beach. The *Morehead City Harbor/Beaufort Inlet Proposed 933 Project* is the answer for which we had hoped.

**Response:** Noted. See response to comment 5, below.

**Comment 4:** Brief History of Accelerated Erosion Rates at Pine Knoll Shores since 1993: The dry beach at Pine Knoll Shores actually accreted from 1987 to 1992. My home was built in 1987 with a 100' setback. My neighbor built in 1992. His footprint is five feet in front of mine. The 1993 *Morehead City Harbor Project* deepened Beaufort Inlet from 40' to 47' and broadened the inlet 100' to 450'. In 1994, Hurricane Gordon brushed the eastern coast of North Carolina in November. Although the effects on the eastern end of the island were minimal, the primary vegetation line from Pine Knoll Shores to Emerald Isle was devastated. Pine Knoll Shores and Emerald Isle have never recovered from Hurricane Gordon, and each successive hurricane has wreaked havoc with 1000 year old sand ridges, Maritime forests, and turtle sanctuaries. **(Please see the attached newspaper account.) Newspaper article is found in Appendix 2.**

In the *Morehead Improvement Design Memorandum & Environmental Assessment* in March of 1992, the USACE describes the berm design as:

"...a feeder berm which purpose is to keep the material within the littoral system ... This berm is not intended to replenish the beach ... The existing disposal method ... removes the sand from the littoral system entirely..."

In 1994, at the Request of the N.C. Department of Coastal Management (DCM), the USACE ceased disposal of dredged material on the Offshore Dredged Material Disposal Site (ODMDS) "when weather permitted" and disposed of the sand on a newly created near shore berm in expectation the sand would return to the active littoral system. DCM has observed sand on the nearshore berm has **not** returned to the active littoral system over the last 10 years. DCM has notified the USACE on two occasions this disposal practice is not consistent with the North Carolina Coastal Zone Management Plan. In October of 2002, "disposal of sand outside the active littoral system" was forbidden by North Carolina statute.

**Response:** We disagree with the statement "sand on the nearshore berm has **not** returned to the active littoral system." We also disagree with the implication that the nearshore disposal of Morehead City Harbor Project dredged material is inconsistent with the North Carolina Coastal Management Plan. The purpose of the nearshore disposal area is to return sand dredged from the ebb shoal of Beaufort Inlet to the same inlet shoal system. The Wilmington District has determined that the nearshore disposal area is consistent with the approved North Carolina Coastal Management Program to the maximum extent practicable. The North Carolina Department of Coastal Management (DCM) has reviewed this determination and concurred. DCM has requested updates on the Morehead City Harbor Project and the status of monitoring of the nearshore disposal area.

**Comment 5:** There is no definitive sediment transport study for Bogue Banks and according to the June 2001 USACE 111 Study we do not have time to assign blame for the accelerated erosion rates since 1993:

*... The overall net loss of littoral sediment from the beaches adjacent to Beaufort Inlet between 1936 and 1994 is 19,205,5000 cubic yards ...Beaufort Inlet, in particular, and Morehead City Harbor in general, has trapped littoral material at a higher rate each time the project has been deepened... The offshore profiles six miles west of Beaufort Inlet and all of Shackleford Banks appear to be getting steeper, closer to shore. These offshore changes appear to be directly related to the deflation or deepening of the ebb tide delta of Beaufort Inlet, which is a direct impact of the dredging operations. Unfortunately, the*

*shoreline data does not demonstrate an impact at this time. However, the continuing deepening of the offshore profile is a major concern that needs to be addressed. -Section 111 June 2001*

Our organization believes this 933 *Project Proposal* is the USACE good faith effort to incorporate disposal practices consistent with the *May 2000 Wilmington Harbor Environmental Assessment*, which articulates the geological correlation principle between sediment removal and beach erosion.

*"...the impact of sediment removal... tends to be diffused throughout the impacted area. Since this diffusion process can extend over miles of shoreline, the erosive impact of the sediment removed from the navigation channel and its deposition outside the active littoral zone is difficult to detect in the short term... Years of research by USACE and practical knowledge gained from the operation of the numerous coastal navigation projects dictate this material must be conserved... the removal of a cubic yard of littoral sediment from a tidal entrance or inlet with deposition outside the active littoral zone of the beach will ultimately cause a cubic deficit somewhere within the sand sharing system... The impact of the removal of littoral sediment from the active littoral zone through channel maintenance is identified as a major cause of man-induced erosion.*

**Response:** The purpose of the proposed Section 933 project is to utilize beach quality sand dredged from the adjacent Federal navigation channels and from Brandt Island in order to stabilize eroding beaches on Bogue Banks. We also understand that the North Carolina Coastal Management Program now requires that clean, beach-quality sand dredged from navigation channels in the coastal area not be removed permanently from the active nearshore, beach, or inlet shoal system, unless no practicable alternative exists (NC Administrative Code T15A: 07M.1102). Moreover, as indicated in the June 2001 USACE 111 Study, the continuing deepening of the offshore profile does not demonstrate an impact on the shoreline.

**Comment 6:** The years of research by USACE and practical knowledge gained there from are confirmed in Dr. Orin Pilkey's 1975 novel, ***Living With an Island***:

*The cause of erosion on Bogue Banks (Atlantic Beach/Ft. Macon Park) is not altogether certain. ... A significant part, however, is very likely due to hopper dredging. Hopper dredging consists of removing the sand from channels and dumping it at sea, entirely out of the shoreline system. Thus, sand that would naturally drift across and replenish the beach is lost and erosion rates increase. This is a major problem nationwide.*

**Response:** As indicated in your comment 5, above there is no definitive sediment transport study for Bogue Banks. Moreover, as indicated in the June 2001 USACE 111 Study, the continuing deepening of the offshore profile does not demonstrate an impact on the shoreline.

**Comment 7: Environmental Concerns:** During the permitting process, various government agencies and environmental groups will raise the following environmental concerns.

1. Shell content.
2. Microbial life recovery
3. "Fish Feed" life recovery
4. Coquina, mole crab, destruction
5. Various avarian concerns

There has never been an incident of sand bypassing/beach nourishment in which microbial life did not recover. Turtle sanctuaries are reinvigorated, maritime forests flourish, and 1000-year-old sand ridges become a new line of primary vegetation. The east end of Bogue Banks is testimony to a beach that recovers its natural vegetation and wildlife following renourishment.

**Response:** Please review responses to comment letters from USFWS, NCWRC, and NMFS, above on shell content of the material placed on Bogue Banks, macroinvertebrate recovery, construction windows, and impacts to shorebirds.

**Comment 8:** Conclusion: Section 209 of PL 91-611 (WRDA 1970) states:

*It is the intent of Congress that the objectives of enhancing regional economic development, the quality of the total environment, including its protection and improvement, the well-being of the people of the United States, and the national economic development are the objectives to be included in federally financed water resource projects, and in the evaluation of benefits and cost attributable thereto*

In the cost benefit equation the environmental concerns raised during previous renourishment projects must be weighed against the benefits derived from beach nourishment during initial storm surges. A recent article published by the North Carolina Sea Grant program concluded:

The benefits (of beach renourishment) are actually more dramatic than implied... All of the threatened buildings listed for the three communities were located outside the nourishment project limits or in transition areas at the ends of the projects where the dunes were not constructed. Hurricanes Floyd and Dennis threatened or destroyed 968 buildings outside the three Corps designed nourishment projects' manmade dunes. Remarkably, not even one building behind the project dunes was threatened by erosion - that's ZERO. (Wrightsville, Kure, and Carolina Beach). Failure to permit or fund the project will eventually result in catastrophic loss of property. A chilling review of the USACE *Final Section 111 Feasibility Report: Morehead City Harbor: June, 2001*, by Olsen Associates articulates the consequences.

*Indeed, from a coastal engineering or geology standpoint, it is well known that removal of littoral material in excess of natural conditions results in (erosion) of the shorelines within the littoral system. The significant deflation of the offshore beach profiles documented in the study... must ultimately translate to destabilization of the beach and shoreline... the beach profile cannot continue to steepen without resulting in a landward translation of the shoreline. The condition is analogous to the foundation of a house: i.e., a structure's foundation cannot continue to be undermined without ultimate destabilization of that structure.*

**Response:** As indicated in the Draft Evaluation report, Appendix C, Coastal Analysis, Appendix D, Economic Analysis, and in the EA, the proposed Section 933 project is economically justified, would provide erosion protection, and the impacts to the human

environment are not significant.

## **5.20 Environmental Defense, letter dated June 2, 2003.**

**Comment 1:** First and foremost, we believe that a full Environmental Impact Statement (EIS), rather than an Environmental Assessment (EA), is warranted. Clearly, there will be environmental impacts from this project; in light of the significant impacts from recent beach nourishment projects on Bogue Banks a more thorough analysis is needed.

**Response:** We have reviewed all the comments received on the EA and have revised the project description found in Section 2.0 of the FONSI. Based upon our review of these comments and investigations required to respond to your comments, we believe that the EA/FONSI is an appropriate document for the proposed action and it fully complies with NEPA.

**Comment 2: Cumulative Impacts:** The cumulative impacts analysis is non-existent with regard to biological resources and includes no data. It is merely a comparison of the percentage of area being impacted by this project versus sand deposition activities throughout the state. No attempt is made to address differences in habitat quality which might occur along the ocean beaches. Dr. Charles H. (Pete) Peterson has conducted several studies examining the recovery rates of intertidal infauna on Bogue Banks, and his findings are not nearly as optimistic as the conclusion stated in the EA. A full EIS which incorporates these data and evaluates the impact of the project on the recovery rates of intertidal infauna is necessary. Lack of recovery of these infaunal species has the potential to significantly affect shorebird populations.

**Response:** See response to comment #2 in Dr. Charles H. Peterson letter (5.18) dated May 28, 2003, above and Comment 1 above, regarding the need for an EIS.

**Comment 3: Monitoring:** There is no pre- or post-project monitoring plan. There is only a commitment to monitor and relocate sea turtle nests should construction occur during the nesting season. It should be clear from the sand placement activities which occurred on Emerald Isle and Pine Knoll Shores the past two winters that biological monitoring at the placement site and the mine site must be a required component of any beach nourishment project. The EA states that because the project is "one time only", it is not "appropriate for adaptive management". The sand placement activities at Emerald Isle and Pine Knoll Shores are also part of a one time only project. Without monitoring and data collection, there is no justification for the assertion that recovery of biological communities will be rapid and complete.

**Response:** See response to comment 5 within the NCDENR memo to Melba McGee, from Mike Marshall, NCDMF, (5.12) dated May 19, 2003, above.

**Comment 4: Sediment Analysis:** The sediment analysis for source material from Brandt Island was performed over 10 years ago and must be updated, particularly in light of the poor quality of material placed on the beaches at Pine Knoll Shores and Emerald Isle during the past two seasons. The borrow site for those sand placement events was supposedly thoroughly sampled and analyzed, yet failed to reveal the presence of tires and cobble-sized material. In addition, an analysis of the potential biological impacts of placing presumably finer grained materials on top of the very coarse material already on the beach

needs to be performed. Finally, the composition of the material at Brandt Island could alter the frequency and duration of the turbidity plume and therefore, impacts to surf zone fish species their prey.

**Response:** See response to Comment 11: EFH Recommendations 3 within the NMFS letter (5.05) dated June 5, 2003, above.

**Comment 5:** Again, we must emphasize that the certain impacts from this project warrant the development of a full EIS with a comprehensive analysis of cumulative impacts. Until such time as an EIS is prepared and the concerns expressed above are addressed, we cannot support this project. Thank you for your consideration and for the opportunity to comment on projects which impact our coastal public trust resources.

**Response:** See response to the comment 1, above.

By letter dated July 17, 2003, Environmental Defense had concerns about the lack of time (only 7 days) to review the Draft Unsigned FONSI, sediment analysis, monitoring, cumulative impacts analysis, and our response to Dr. Peterson's letter (5.18), above. Concerns regarding sediment analysis, monitoring, and cumulative impacts analysis are addressed above. Additionally, we have revised our responses to Dr. Peterson's letter (5.18), above.

The 7-day review period for the Draft Unsigned FONSI was determined to be sufficient in order to provide assurances to federal and state agencies that the commitments made during the June 24, 2003 meeting were addressed in the Draft Unsigned FONSI.

#### **5.21 NCCF letter dated June 2, 2003.**

**Comment 1:** The North Carolina Coastal Federation staff has reviewed the document entitled *Draft Evaluation Report and Environmental Assessment, Morehead City Harbor, Section 933, Carteret County, North Carolina*. The following represents our comments on the document and the project.

**Response:** Noted.

**Comment 2:** If there is one lesson we have learned from our experience in reviewing and critiquing beach renourishment projects over the past four years, it is that haste makes waste. Whenever the applicants and/or the Corps of Engineers have sought expedited, or cursory review of projects, including the local beach renourishment projects on Bogue Banks, the Sea Turtle Restoration Project on Oak Island, and the Mason Inlet Relocation Project, the projects have been laden with unexpected environmental problems. In the interest of time, the Corps chose not to proceed with an EIS in either the Bogue Banks and Mason Inlet projects. In the Oak Island Sea Turtle Restoration Project, the Corps failed to adequately characterize the sediment at the Yellow Banks disposal area, and boulders were pumped onto the beach. More boulders are uncovered on the Oak Island beach with each high tide even today, several years after project completion.

**Response:** The USACE desires to protect the fish and shellfish resources of the project area. The proposed Section 933 action is a civil works project and therefore Corps' inspectors will be assigned to monitor the hydraulic dredge, pipeline route, booster pumps



(if required), and placement sites on the beach. These inspectors review the ongoing work for safety, as well as making sure that the contractor complies with all conditions (found in the plans and specifications) of the contract. We will include the following paragraph in the proposed Section 933 specifications, *“Materials: The dredging shall be accomplished so that the most suitable material available for beach disposal is placed within the prescribed section. Suitable materials shall be comprised of materials by ASTM D 2487 as SP, SP-SM, and SW. This material shall be predominantly of sand grain size with no more than 10% silt, shell, and clay material present. Should the dredge encounter materials not suitable for placement on the beach, the Contractor will be directed by the Contracting Officer to move to a more satisfactory location within Brandt Island or the navigation channels.”* If problems occur during construction anywhere along the pipeline route or if the contractor is not abiding by the conditions of the contract (i.e., pumping material to the beach that is not suitable), these Corps inspectors would immediately notify the Contracting Officer (CO) located at the District office and the CO would direct the contractor to move the dredge to a more suitable site in Brandt island or the navigation channels.

**Comment 3:** We strongly recommend that, an environmental impact statement (EIS) be prepared for this 933project. Recommendations that an EIS be conducted were made to the Corps by federal and state resource agencies during the scooping period. If the Corps is not willing to recognize the appropriateness and necessity of an EIS for this project, we will recommend that the Division of Coastal Management find the project inconsistent with state policies due to the potential environmental impacts described in this letter.

**Response:** We have reviewed all the comments received on the EA and have revised the project description found in Section 2.0 of the FONSI. Based upon our review of these comments and investigations required to respond to NCCF and the other comments, we believe that the EA/FONSI is an appropriate document for the proposed action and it fully complies with NEPA.

**Comment 4: Alternatives.** The alternatives analysis should include an alternative that spreads the pump out of Brandt Island over several seasons. The Environmental Policy Act requires the Corps to evaluate an alternative that would avoid environmental impacts, in addition to the no action alternative. In this case the no action alternative is identical to the existing authority to dispose of dredged material on the beaches of Fort Macon and Atlantic Beach. The Corps must also analyze a less damaging practicable alternative that would avoid, rather than minimize, environmental impacts by honoring the moratorium for shorebirds as established by the NC Wildlife Resources Commission and for fisheries as established by the NC Marine Fisheries Commission. These moratoria would limit the period for beach disposal of sediment to November 16 until March 31. While it is clear that this alternative would require the redeployment of pipelines and other equipment in future years, it is an alternative that requires further analysis and public review. We request that the Corps include an analysis of this alternative in its EIS.

**Response:** See the revised project description found in Section 2.0 of the FONSI. The revised construction window is from November 1, 2003 to April 30, 2004 (to May 31, 2004, if required). Section 1.03 of the EA, states “Should present plans for sharing sand by Bogue Banks beaches not materialize due to funding problems or other unforeseen reasons, dredged maintenance material from the inner and the outer harbor, as well as the pump out of Brandt Island would be distributed according to the base disposal plan. The base disposal plan represents the least cost alternative for the government, which is engineeringly feasible and environmentally acceptable”.

**Comment 5: Project Timetable.** The Draft 933 Environmental Assessment proposes to pump out Brandt Island and place sediment material on the beach from Fort Macon State Park to Indian Beach for 16 consecutive months. The NC Wildlife Resources Commission and the NC Marine Fisheries Commission have established moratoria on beach fill activities that would limit construction to the period from November 16 to March 31. These moratoria were developed to protect the food sources for migrating shorebirds and fish in the surf zone during periods of peak biological activity. The Draft EA is inconsistent with state policies inasmuch as it proposes to violate these moratoria.

**Response:** See response to comment #3 in NCWRC letter (5.14) dated May 27, 2003, above.

**Comment 6: Economic Impact.** The Draft 933 EA has determined that the benefits of this project outweigh the costs by a factor of 4.9 to 1. The singular argument made by the Corps in its EA for conducting nonstop beach fill activities for 16 consecutive months is the increased redeployment cost of pipelines and other equipment in future years if the project was required to honor the NC Wildlife Resources Commission and NC Marine Fisheries Commission moratoria policy on the placement of fill on the beach during periods, of high biological activity. Given the high benefit to cost ratio established in the economic impact analysis, the cost of redeploying pipeline and other equipment is a reasonable and practicable expense. The cost of mobilization and deployment is estimated to be \$2.85 million. If the cost of redeploying pipeline and other equipment were added to the costs of the project, the benefit to cost ratio would still be approximately 4 to 1. Given this generous benefit to cost ratio, there is no compelling economic argument not to honor the moratoria.

**Response:** See response to comment 4, above.

**Comment 7:** The Draft 933 EA estimates the benefits of the 933 project using storm damage reduction savings and recreational benefits to day users, among other criteria. During 2001-2002, a locally funded beach renourishment project was conducted on the same beaches (Pine Knoll Shores, Salter Path and Indian Beach) that are under consideration in the Draft 933 EA. The locally funded project was reviewed and permitted by the Corps of Engineers Wilmington District. The longevity of the locally funded project was ten years. The locally funded project also projected storm damage reduction savings and benefits to day users, among other criteria. The Draft 933 EA also has a projected life of ten years. Both projects propose to save the same oceanfront and second row structures from storm damage and long-term erosion. The Draft 933 EA is in effect-double counting benefits that have already accrued to the protection of structures and recreation on Pine Knoll Shores, Salter Path and Indian Beach. *Since* the Corps of Engineers reviewed and approved the: locally funded economic impact analysis, these benefits should serve as a baseline *upon* which the additional benefits of the 933 project can be calculated. The question is how much additional benefit will these same said structures and beachgoers receive over and above the benefits provided by the locally funded beach fill project? If, the locally funded project did not meet its objectives, then what is the revised lifespan of the locally funded project and what is the revised baseline, i.e. costs and benefits, of the locally funded project?

**Response:** The proposed 933 project considered the locally financed project in place and as part of the without project condition. Benefits were computed for the 933 project as compared to the without project condition, which included all proposed locally financed nourishment.

**Comment 8:** The Corps should also explain why it uses a 20-year period for its cost benefit analysis when the project is only expected to last 10 years. The use of a 20-year period is particularly important inasmuch as the Corps is also evaluating a 50-year *civil works* project for the entirety of Bogue Banks that is expected to be built prior to the end of the 10-year life of the proposed 933 project. We question whether the proposed 933 project has any economic benefits that have not already been realized by the locally funded project, or that will be realized by the 50-year civil works project.

**Response:** The period of analysis of 20 years was selected to take into account the expected life of the nourishment of 10 years and any immediate impacts in the period after the fill is expected to be gone. Both the with and without project conditions were evaluated over the same period of analysis. The Bogue Banks long-term project will consider all previous nourishments as part of the without-project condition.

**Comment 9:** Environmental Impacts/Cumulative Impacts. The Draft 933 EA fails to seriously consider the environmental impacts and the cumulative impacts of the proposed 933 project on biological resources on Pine Knoll Shores, Salter Path and Indian Beach. The locally funded project has had a devastating effect on macro faunal invertebrates on these beaches as documented by Peterson et al. The Draft EA fails to consider any biological monitoring data from scientists such as Peterson or from the local project's biologist. The Draft 933 EA examines the impact of beach fill projects in the abstract, rather than evaluating the wealth of current data that is available for these beaches. The question that should have been addressed in the Draft 933 EA and which must be examined in the EIS is what is the cumulative biological impact of burying invertebrates on beaches that have not fully recovered? In addition, fill material that is widely regarded as incompatible was placed on a significant portion of Emerald Isle: The question this Draft EA failed to consider is what is the cumulative impact on birds, fish, and invertebrates of conducting another beach fill project before the beach ecosystem has had time to reestablish itself? As the Draft 933 EA notes, the recovery rates for beach ecosystems is generally from 1 to 3 years. The timeframe is shorter when beach material is compatible and longer when beach material is not compatible. These are questions that will require close examination of existing research as well as field studies that are appropriate to the EIS.

**Response:** See response to Comment 12 within the NMFS letter (5.05) dated June 5, 2003, above regarding environmental and cumulative impacts. Regarding "the monitoring data from scientists such as Peterson or the local project's biologist" as well as cumulative impacts on birds, fish, etc. and recovery times, please review comment 2 within the Dr. C. H. Peterson letter (5.18) dated May 28, 2003, above.

**Comment 10:** Sediment Compatibility. The draft environmental document is the appropriate vehicle to *publicly* share data collected on a given project. In the Draft 933 EA, the Corps shares its belief (ER-43) and provides assurance (ER-44) that the sediment will be compatible with the natural beach and for sea turtle nesting. The Draft 933 EA indicates that data will be collected on sand compatibility along portions of the proposed project area, but this data is not contained in the Draft EA-and is not available for public review. All relevant data must be included in draft environmental documents. The public has a right to

comment on data, not beliefs and assurances, particularly given the Corps' past acceptance of incompatible material on Bogue Banks, Oak Island and from Mason Inlet.

**Response:** See response to Comment 11 within the NMFS letter (5.05) dated June 5, 2003, above.

**Comment 11:** Public Access and Parking. The Corps' guidelines require public access in order for the federal government to share in the costs of a storm damage reduction project." These guidelines for public access and parking indicate "public use means use by all on equal terms." The public access and parking plan in the Draft 933 EA presents a stark disparity between public access and parking sites along the project area. It is remarkable that the areas that provide the greatest public access, Fort Macon State Park, are slated to receive the same volume of sand as areas with the least amount of public access.

**Response:** The Corps does not formulate project for recreation. It is only an incidental benefit.

**Comment 12:** The Corps conducted its public access survey using aerial photography taken between 11:15 AM and 11:40 AM on July 4, 2002. The Town of Pine Knoll Shores had only one public access site open on that date, which was opened during a June 28 ribbon cutting. On the day of the Corps' survey, Pine Knoll Shores was essentially a privately accessed beach. It is not feasible to evaluate public access on a privately accessed beach. We also question how the time between 11:15 and 11:40 on a single day constitutes peak hour demand. I personally have traveled to the state beach access at Salter Path on numerous occasions to find the lot full and cars parked illegally on Highway 54.

**Response:** The Corps has traditionally considered the 4<sup>th</sup> of July as the peak visitor day for beaches. We obtained traffic count data from the NC Department of Transportation over the two bridges onto the island for the 4<sup>th</sup> of July over several years and found that the peak usage occurred around this time and date.

**Comment 13:** The survey methodology is seriously flawed, as are the results. We strongly recommend that the Corp follow through on the revised parking survey methodology as described in Appendix E-5 to revisit the parking issue this summer. The revised parking survey should also be conducted on multiple peak days, and at a variety of times and locations on those days.

**Response:** See Appendix E-5, "Parking Analysis Methodology", 3<sup>rd</sup> paragraph. The document was reviewed by an independent technical review team, as well as USACE District, Division, and Headquarters and it was determined that the analysis adequately analyzed the demand and is consistent with guidance. Future recreation studies will continue to improve through the use of criteria such as those suggested above.

**Comment 14:** The access plan for Pine Knoll Shores is a violation of Corps guidelines governing public use. The Corps guidelines for public use states:

*Lack of sufficient parking facilities for the general public (including non-resident users), located reasonably near and accessible to the project beaches or lack of public pedestrian*

*rights-of-way to the beaches at suitable intervals would constitute de facto restriction on public access and use of such beaches, thereby precluding eligibility for Federal assistance. EP 1165-2-1 Chapter 14-1(b)(2)*

**Response:** The sponsor's plan presented in the document provides additional public beach access and parking (or transportation to access). We believe it is a significant increase over their initial public access and parking scenario and is consistent with Corps guidance. The Plan was reviewed by an independent technical review team, as well as USACE District, Division, and Headquarters and it was determined that the sponsor's commitments will provide adequate access and parking per our regulations.

**Comment 15:** The use of public transportation by the Town of Pine Knoll Shores to transport visitors from existing beach parking areas to planned beach access areas meets neither the letter or the spirit of the public use definition in Corps guidelines. Historically, Corps guidelines have allowed public transportation, but only "to reduce automobile pollutants by encouraging public transportation." Nowhere has Pine Knoll Shores stated that its "motivation is in reducing automobile pollutants and the public access plan would not reduce automobile pollutants anyway.

**Response:** Corps guidance on the use of public transportation allows flexibility in applications to include reasons such as: reducing pollutants, available space, roadways, natural area avoidance, etc. The document was reviewed by an independent technical review team, as well as USACE District, Division, and Headquarters and it was determined that the sponsor's commitments for public transportation will provide adequate access per our regulations, and are consistent with Corps policy.

**Comment 16:** The Corps has offered no corroborating data from any comparable beach community to justify that this experiment will provide any benefit to day users of the beaches at Pine Knoll Shores. Why would a day user park near the beach and then take a shuttle to another access area? Is the public expected to carry cellular phones, in order to reach the public transportation carrier during the off season? Unless the Corp can provide data and justification that this transportation system has worked in a town setting similar to Pine Knoll Shores, we strongly recommend that the project be scrapped.

**Response:** We do plan to monitor use and make adjustments as necessary. See Appendix E-12, "Monitoring/Adaptation of Transportation Plan"

**Comment 17:** In our view, the primary purpose of the public transportation plan is to gain a higher percentage of federal cost share funds. It is not clear to us that the Town of Pine Knoll Shores has exhausted all practical options in providing appropriate parking at each proposed access site. There are gated private parking lots within walking distance to the beach that could be purchased or condemned that could accommodate ten or more parking spaces.

**Response:** Providing adequate public transportation is expensive and logistically difficult therefore we believe that the Town of Pine Knoll Shores will continue to evaluate beach access and parking as an alternative to public transportation.

**Comment 18:** The public transportation plan does not provide a realistic alternative for the public to access what will continue to be privately accessible beaches.

By accepting their flawed concept of public transportation to reach multiple beach accesses in Pine Knoll Shores, the Corps has violated public faith in the notion that Federal funds will only be used to provide storm damage reduction benefits to beaches that the public can access on an equal basis.

**Response:** See response to comment #14, above.

**Comment 19:** We recommend that the Corps provide the Town of Pine Knoll Shores until November 1, 2004 to meet the public parking criteria that requires a minimum of ten parking places and handicapped access for each beach access within the town limits. If the town cannot meet the public access requirement by that date, the Corps should require the town to pay 100 percent of the cost of placing beach fill on areas that do not conform to the Corps guidelines.

**Response:** Pine Knoll Shores continues to evaluate its options, and the Corps will ensure that access and parking requirements are met for those sections of beach which are Federally cost shared.

**Comment 20:** State Easements. North Carolina law requires an easement for performing work that involves alterations to state lands. The beach up to the high tide land is state property in North Carolina. Any land disturbing activity requires an easement from the Department of Administration and approval of the Council of State. The Corps should describe how it plans to obtain an easement to alter state lands.

**Response:** There will be no alteration of state lands as part of the Section 933. All work for the Section 933 will be performed in areas in which the Towns of Pine Knoll Shores and Indian Beach/Salter Path have obtained perpetual easements.

**Comment 21:** Turbidity in the Construction Areas. The Draft EA states "Turbidities outside of the construction or mixing zone would not exceed the state standard of 25 NTU's in all saltwater classes." The EA has not indicated how the Section 401 Water Quality Unit defines and delineates the area of construction. The EA also does not indicate when a portion of the beach ceases to be a construction area in time or spatial terms. Research by Peterson, et al, has shown that turbidity continued for months after the completion of beach construction at Emerald Isle. The EIS should evaluate Peterson's data and model the turbidity that will be generated during the proposed project.

**Response:** As a part of the Wilmington Harbor Deepening project, sand was placed on the beaches of Brunswick County, NC. This project involved extensive monitoring, including turbidity, which was performed by our contractor, Versar Inc. The first year report is available at <http://www.saw.usace.army.mil/wilmington-harbor/main.htm> under Monitoring Reports. The second year report should be available later this summer.

A summary of the turbidity monitoring from the first year report is as follows: "Water quality monitoring at the two Oak Island fishing piers revealed that beach replenishment operations did not create large increases in turbidity over background conditions. While turbidity spikes were observed when the pipeline was near both piers, similarly high turbidity values were recorded during periods when the beach replenishment operations were miles from the monitoring sites or when dredging operations were temporarily shut down. These large non-dredged related turbidity events were most likely caused by periodic storm surges and

heavy surf conditions. Turbidity plume mapping revealed that the turbidity created by the pipeline discharge hugged the shoreline following the long-shore currents. On-shore wind events contributed to keeping turbidity plume close to shore and in most cases the plumes were not discernable from turbidity created by the breaking waves in the surf zone a few 100 meters away from the end of the pipeline. Elevated suspended sediment loads outside of the surf zone were rarely observed." Even though the percent fines in the Morehead City project will be less than Wilmington Harbor Project, we anticipate results will be similar.

Modeling is difficult to perform for this type of action because of numerous variables. The extent of the turbidity plume would vary depending of the amount of fines in the nourishment material; dredge pumping rate which can vary depending of size of dredge, pumping distance, and need or not for booster pumps; wind, wave, and current velocity and direction, etc.

The Water Quality Unit does not define the construction area. The Corps generally maintains a 1,000 foot wide fenced construction/safety zone (about 500 feet either side of the end of the pipeline) to preclude potential injury to the public from construction equipment.

Regarding the research by Peterson, we understand this information has not been published and to date this information has not been provided to the Corps.

NCCF had concerns about the lack of time (only 7 days) to review the Draft Unsigned FONSI. Please see our response to the one-week review found at the end of the Environmental Defense letter (5.20), above.

**5.22 Andrew Coburn, Associate Director, Program for the Study of Developed Shorelines, Nicholas School of the Environment and Earth Sciences, Duke University, e-mail dated June 3, 2003.**

**Comment 1:** This document contains comments and questions pertaining to the *Draft Evaluation Report and Environmental Assessment: Morehead City Harbor Section 933* and is being submitted to the US Army Corps of Engineers Wilmington District by the Duke University Program for the Study of Developed Shorelines.

Comments on Appendix E: Beach Access/Parking Analysis and Requirements

Appendix E contains a significant number of errors, issues and discrepancies that need to be resolved. The quality of data used to determine current and projected public access and public parking needs is inaccurate; the analyses that rely on this data are flawed; population growth rates used to estimate the future peak hour usage are incorrect and huge discrepancies regarding beach usage remain unresolved. It is also clear that the study area fails to meet Federal Policies and Authorities regarding the geographic distribution of public access and public parking. Specific comments and questions follow:

Determinations of public access, public use and public parking needs and demands are based on one 25-minute observation along a shoreline that is classified as private in Engineering Regulations 1105-2-100 or 1165-2-130.

What procedures are typically employed by Wilmington District to evaluate public beach use and public parking demands?

**Response:** The procedures used to evaluate demand can be found in Appendix E of the Draft Evaluation Report, under “Beach Capacity vs. Peak Hour Demand”.

**Comment 2:** How can the Corps justify its decision to spend tens of millions of taxpayer dollars on this project when it fails to meet the cost-share criteria outlined in Engineering Regulations 1105-2-100 or 1165-2-130?

**Response:** The requirements necessary to obtain the full 65%/35% Federal/Non-Federal cost sharing were outlined in Section 1 of the Main Report as well as Appendix E under Access and Parking. The Corps has determined that the non-Federal sponsor’s commitments will meet these requirements.

**Comment 3:** The EA makes projections based on the amount of public access and parking currently available in the study area, which does not meet the federal cost share guidelines. How can the Corps make an accurate estimate of future peak hour demand when the area fails to provide either adequate public access or public parking, as defined in Engineering Regulations 1105-2-100 or 1165-2-130?

**Response:** See response to comment #14 to NCCF letter (5.21) dated June 2, 2003.

**Comment 4:** In a letter dated May 16, 2003 Colonel Charles Alexander states, “...the US Army Corps of Engineers, Wilmington District intends to ensure the requirements as indicated in US Army Corps of Engineers Engineering Regulations 1105-2-100 and 1165-2-130 are adhered to for this and all shoreline protection projects.” However, neither existing Department of the Army public access nor public parking requirements contained in Engineering Regulations 1105-2-100 and 1165-2-130 are being adhered to in the project area. Please explain the discrepancy between Colonel Alexander’s stated position and the fact that minimum public access and parking requirements as indicated in US Army Corps of Engineers Engineering Regulations 1105-2-100 and 1165-2-130 are not being adhered to.

**Response:** See response to comment #14 to NCCF letter (5.21) dated June 2, 2003.

**Comment 5:** According to ER 1165-2-130, “In the event public access points are not within one-half mile of each other, either an item of local cooperation specifying such a requirement and public use throughout the project life must be included in project recommendations or the cost sharing must be based on private use.” According to Appendix E, public access points are not available, nor are they projected to be available, every one half mile in the project area. Since the project area fails to meet existing policies and authorities concerning public access and parking, and since no item of local cooperation specifying such a requirement is provided, why isn’t the project being cost-shared based on private use?

**Response:** As explained in previous responses, Appendix E-8, 1<sup>st</sup> paragraph states that the sponsor’s current access and parking plan meets the Corps’ parking and access criteria and therefore are cost shared at the full 65%/35% as detailed under “Cost Sharing Percentage”.



**Comment 6:** According to ER 1165-2-130, public transportation facilities may substitute for or complement parking facilities in some instances in which state and local plans call for a reduction in automobile pollutants. Please provide a compilation of all state and local plans that call for a reduction in automobile pollutants in the project area.

**Response:** See response to comment #14 to NCCF letter (5.21) dated June 2, 2003.

**Comment 7:** In the absence of such documentation, please provide the specific rules under which the Wilmington District has the authority to allow a public transportation system to serve as a substitute for meeting explicit public access and parking policies and authorities as contained in ER 1165-2-130 and 1105-2-100.

**Response:** See response to comment #15 to NCCF letter (5.21) dated June 2, 2003.

**Comment 8:** How many Section 933 projects have allowed public transportation in lieu of providing adequate parking, and where are they located?

**Response:** There are several projects which fall in areas which have existing public transportation available prior to the project being put in place, however, we were unable to find any examples of projects that have implemented a public transportation system specifically to meet parking and access requirements.

**Comment 9:** On Page E-1, an assumption is made that visitors require 100 square feet of beach per visit. Upon what data is this assumption based?

**Response:** This is a conservative number based on previous Corps studies. Many of the studies used 150 square feet or more as their assumption. This would have reduced the number of potential visitors, thereby reducing the potential capacity of the beach, and the associated parking requirements.

**Comment 10:** The estimation of peak hour usage/demand is based upon a 25-minute snapshot of beach visitation taken between 11:15 and 11:40 am on July 4, 2002, and the EA assumes that almost the same number of people were under tents and umbrellas than were visible on the beach. What was the weather in the study area between 11:15 and 11:40 am on July 4, 2002?

**Response:** Sunny with a little haze present.

**Comment 11:** Is it reasonable to assume that the number of people under a tent or umbrella would be equal to the number of people visible on the beach?

**Response:** The number was 34% more individuals for Pine Knoll Shores and 48% more individuals under tents/umbrellas for Indian Beach. This was deemed reasonable and conservative. The more individuals we assume to be on the beach, the more parking is required. We would error on the side of ensuring adequate parking by making this assumption.

**Comment 12:** Upon what data is the assumption that an average of 2 people were under each tent and 1.5 people were under each umbrella based?

**Response:** The contractor providing the aerial photography and calculations suggested numbers based on their experience.

**Comment 13:** How can peak hour usage/demand be estimated with any degree of accuracy using one 25-minute aerial observation taken on one day of the year?

**Response:** The Corps has traditionally considered the 4<sup>th</sup> of July as the peak visitor day for beaches. We obtained traffic count data from the NC Department of Transportation over the two bridges onto the island for several years of 4<sup>th</sup> of July traffic and found that the peak usage occurred around this time.

**Comment 14:** On page E-2, the EA states that July 4 is assumed to be the peak day of the year for visitors on beaches. Upon what data is this assumption based?

**Response:** See response to comment #13, above.

**Comment 15:** What evidence is available to show that peak beach usage occurs between 11:15 and 11:40 am?

**Response:** See response to comment #13, above.

**Comment 16:** On page E-2, the EA states that a higher number of visitors may have been present if July 4 had fallen on a weekend, and that the actual numbers were increased by 14.2% based on the volume of traffic crossing the two bridges onto Bogue Banks on Friday, July 5. Page E-2 states that the assessment completed on July 4 is not accurate. Why wasn't the assessment undertaken on Saturday July 6 or Sunday July 7?

**Response:** The weather on Saturday, July 6<sup>th</sup> was not conducive to aerial photography and an additional flight on Sunday, July 7<sup>th</sup> was flown and found to have a lower number of visitors. Therefore the greater number from the 4<sup>th</sup> of July flight was used.

**Comment 17:** Since Friday is not typically considered a weekend, why were traffic counts for Friday July 5<sup>th</sup> used instead of traffic counts for Saturday July 6 and/or Sunday July 7?

**Response:** From the NC Department of Transportation data, we found that July 5<sup>th</sup> had the greatest traffic volume of any of the days mentioned.

**Comment 18:** What was the actual volume of traffic on each bridge on July 5<sup>th</sup>?

**Response:** Appendix E-2, 1<sup>st</sup> paragraph addresses traffic volume.

**Comment 19:** During what time period was the traffic count conducted on July 5?

**Response:** Every hour over the 24 hour time period.

**Comment 20:** What percentage of traffic crossing these bridges used the beaches in the study area?

**Response:** The Corps assumptions are stated on Appendix E-2, 1<sup>st</sup> paragraph of the Draft Evaluation Report.

**Comment 21:** What was the actual traffic volume on each bridge on July 4?

**Response:** See response to Comment #18, above.

**Comment 22:** During what time period was the traffic count conducted on July 4?

**Response:** See response to Comment #19, above.

**Comment 23:** How, exactly, was the figure of 14.2% obtained?

**Response:** See response to comment #20, above.

**Comment 24:** On page E-2, the peak hour demand in the project area is projected to be 2,835 in the year 2014. This figure is based upon an average North Carolina annual growth rate of 1.8% between 2000 and 2010. It is implausible to assume that daily visitors to the project area are, and will be, distributed equally throughout the entire state. A more accurate analysis should assume that the majority of daily visitors to the project area is, and will remain, from North Carolina's coastal region. Therefore, population growth rates specific to North Carolina's coastal municipalities, as contained in 15A NCAC 07B .0701, should have been used to predict future beach and parking demand. Why were CRC-approved population growth rates for coastal NC not used in this study?

**Response:** Division of Coastal Management has stated that the growth rates referred to in this section are not spelled out, but rather are made up of Census data from the past 10 years which is also where the NC Demographics Office gathers its data.

**Comment 25:** On page E-2, the EA states that only 30% (59 out of 171) of all available parking spaces in the project area were filled during the peak usage time period between 11:15 and 11:40 am on July 4, 2002. Such a low demand for parking during the stated peak period of demand appears inconsistent with the definition of "peak demand." Could this indicate that the peak demand did not actually occur during the time of observation?

**Response:** The observed numbers were adjusted to account for differences in peak demand. See Appendix E-2, 1<sup>st</sup> paragraph of the Draft Evaluation Report.

**Comment 26:** How does the Wilmington District resolve or explain this discrepancy?

**Response:** See response to comment #25.

**Comment 27:** On Page E-3, the Corps estimates that each car contains 2 persons. The communities in the study region actively promote themselves as "family

beaches” which means there is a strong likelihood that each car contained more than 2 persons. Upon what data is the assumption that each car contains only two individuals based?

**Response:** The data was determined looking at the number of visitors on the beach at Fort Macon and the number of vehicles in the lot. The assumption is that there is little likelihood that the individuals on the beach are coming from any houses since it is a considerable distance from any private housing. Therefore the number of individuals on the beach was divided by the number of vehicles in the lot and resulted in an average of 2 persons per vehicle. Other studies have used 2.5 and 3.0 persons per vehicle.

**Comment 28:** The peak hour parking demand projections on page E-3 use the 1.8% growth rate for the entire state of NC. Why wasn't this calculation based on coastal growth rate projections contained in 15A NCAC 07B .0701?

**Response:** See comment #24.

**Comment 29:** On Page E-4 the EA states, “...it is important to keep in mind that meeting peak hour capacity does not alleviate the sponsor's obligation to provide parking within one quarter mile of each access site.” Does the sponsor provide parking within one-quarter mile of each access site?

**Response:** The sponsor's plan provides parking and public transportation to meet the Corp's parking and access criteria.

**Comment 30:** On Page E-4, the EA states that the percentage of “day-users” in PKS is 3.5% and is significantly lower than the average for beach studies. What is the average percentage of “day-users” for Corps beach studies?

**Response:** See Appendix E-2, Paragraph 4 and Appendix E-4, paragraph 5 of the Draft Evaluation Report.

**Comment 31:** How does the Corps resolve or describe this significant discrepancy?

**Response:** The discrepancy was discussed on Appendix E-4, under the “\*Note” in the Draft Evaluation Report.

**Comment 32:** Why shouldn't this significant difference affect the validity of the EA?

**Response:** This is addressed on Appendix E-5, under Parking Analysis Methodology, paragraph #3, in the Draft Evaluation Report.

**Comment 33:** The Corps, under NOTE on Page E-4, admits that the calculations in the document are inaccurate due to a number of factors including a discrepancy in the estimated peak day, day-visitor beach population in Pine Knoll Shores. According to the Pine Knoll Shores' 1996 Land Use Plan, the town estimated its peak day, day-visitor population to be in excess of 50,000 persons. The EA, however, determined the peak hour, day-visitor beach population demand in PKS to be 50 persons. Even if this hourly demand

is multiplied by 24, the peak day, day-visitor beach population in PKS, according to the EA, is 1,200. How does the Corps explain the enormous discrepancy in peak day, day-visitor populations between its calculations and the estimates provided by the PKS police department?

**Response:** We did not develop the PKS data and therefore cannot speak to its validity. Various studies using different methodologies often produce widely different results.

**Comment 34:** What reason can the Corps provide for not using the peak day, day-visitor population data contained in the Pine Knoll Shores 1996 Land Use Plan?

**Response:** The Corps did not find Pine Knoll Shore's findings to be reproducible.

**Comment 35:** On page E-5, under Parking Analysis Methodology, the proposed project is compared to a recently completed, locally funded project with no federal public access/parking policies and authorities in which the local communities still have not met pre-project public access promises made to secure state funding. How can the Corps compare a federally funded project to a locally funded project with no federal public access/parking policies and authorities?

**Response:** The locally funded project was in place when we prepared the analyses of the 933 project. Visitation for that project was reflected in the existing conditions. The locally funded project has met the State required parking.

**Comment 36:** On page E-5, under Parking Analysis Methodology, the EA states that parking is a component of the recreation analysis. Assuming the EA is accurate and significantly fewer people are using the beach on a daily basis, how will this affect future analyses of recreational benefits?

**Response:** We expect to conduct additional recreation studies before doing future beach recreational analyses.

**Comment 37:** The conditions and stipulations contained under Access and Parking Requirements on Page E-5 are ambiguous and confusing. According to ER 1165-2-130 and 1105-2-100, adequate parking must be within ¼ mile of each access. On Page E-6, the Corps is allowing parking to be equally distributed within 2-mile stretches. The criteria presented for the selection of two miles is irrelevant. The issue is the geographic distribution of public parking and public access, not the minimum length of a Corps beach nourishment project. The fact remains that the study area does not meet existing federal policies and authorities pertaining to public access and parking. What authority does the Corps' Wilmington District have to disregard existing federal policies and authorities regarding the geographic distribution of public access and public parking?

**Response:** We have no authority to disregard federal policies or authorities and we do not. See response to comment #14 to NCCF letter (5.21) dated June 2, 2003.

**Comment 38:** On Page E-6, section 4 B is extremely confusing. The passage reads, in part, "In order to meet the spirit of the regulations to provide public access to those beaches receiving Federal funding for a Section 933 project, it was decided that the

sponsor should provide this minimum.” From this wording, it appears that the regulations have not been met. What does the “spirit” of the regulations mean, how does this differ from actually meeting the regulations?

**Response:** Because Corps regulations do not specifically spell out the number of spaces required per access, we developed criteria based on what we interpreted to be the intent of the regulations. The current parking was found to meet peak hour demands, however, it was decided that a minimum number of parking spaces per access and a distribution needed to be established in addition to meeting peak hour demand.

**Comment 39:** If the regulations have not been met, why isn’t the Corps enforcing them?

**Response:** They have been met and we are enforcing them. See response to comment #14 to NCCF letter (5.21) dated June 2, 2003.

**Comment 40:** In Section 5 on Page E-6: How will the sponsor be held responsible for providing the required number of parking spaces?

**Response:** Through the Project Cooperation Agreement

**Comment 41:** What is the period of analysis of the project?

**Response:** 20 years

**Comment 42:** What is meant by “on an equal basis?”

**Response:** Everyone will have access whether they live on the beach, live on the island, live off the island, or even in another state.

**Comment 43:** What is meant by “Failure to do so would result in sections of the project reverting to private beach status...?”

**Response:** This means that the section would no longer be in compliance with Corps criteria and therefore is deemed to be a “private” beach.

**Comment 44:** What is the timeframe being discussed?

**Response:** The life of the Section 933 fill is expected to be 10 years..

**Comment 45:** What criteria will be used to determine whether a section of the project does not meet “Corps parking criteria” and what parking criteria is being referred to here?

**Response:** The criteria as outlined in Section 1 of the Main Report and “Access and Parking Requirements” of Appendix E-5.

**Comment 46:** In Item 6 on page E-6: What authority does the Corps Wilmington District have to allow public transportation to substitute for adequate public parking as defined in to ER 1165-2-130 and 1105-2-100?

**Response:** See response to comment #15 to NCCF letter (5.21) dated June 2, 2003.

**Comment 47:** What enforcement mechanism will be used by the Corps to ensure that a public transportation system is provided year-round?

**Response:** See response to comment #40.

**Comment 48:** What happens if the local sponsor fails to follow through on its commitment?

**Response:** See response to comment #40.

**Comment 49:** Under Existing and Proposed Parking and Access Sites on Page E-7: What authority does the Wilmington District have to allow public transportation to substitute for adequate public parking as defined in to ER 1165-2-130 and 1105-2-100?

**Response:** See response to comment #15 to NCCF letter (5.21) dated June 2, 2003.

**Comment 50:** Under Existing and Proposed Parking and Access Sites on Page E-7, the EA states that there is an 82% decrease in demand during the off-peak season. How was this figure calculated?

**Response:** By comparing peak visitation as determined by weighted annual visitation (Appendix D-20, Table 10, in the Draft Evaluation Report) during peak and off-peak season.

**Comment 51:** On Page E-8, an exception to existing public access requirements was given to a section of Indian Beach based on "environmental conditions." What are the specific environmental conditions that prompted the exception, and what authority does the Wilmington District have to make such an exception?

**Response:** The location of the access area was adjusted by less than .1 mile to avoid impacting a vegetated State Park property.

Duke University Program for the Study of Developed Shorelines had the following major issues with the Draft Unsigned FONSI: the lack of time (only 7-days) to review the Draft Unsigned FONSI, that an EIS is required for the proposed action, impacts to beach macrofauna and essential fisheries habitats, cumulative impacts, mitigation plan for removal of incompatible sand placed as a result of the proposed action on Bogue Banks, no post project biological monitoring, and issues on base conditions, economics, public access, parking, and storm impacts.

See response to Environmental Defense letter (5.20), above on the 7-day review of the Draft Unsigned FONSI, letters to NMFS, USFWS, NCWRC, NCDMF letters above

discussing impacts to beach macrofauna and essential fisheries habitats, cumulative impacts, and mitigation plan for removal of incompatible sand placed as a result of the proposed action on Bogue Banks. As indicated during our meeting on June 24, 2003, a representative from Carteret County stated that they would continue monitoring the Phase 1 area (Pine Knoll Shores to Indian Beach (including Salter Path)) beyond November 2003, if adequate recovery of mole crabs and coquina clams does not occur. If required the monitoring would be extended to November 2004. Please note if the Section 933 project is not funded, Carteret County will not extend the monitoring until November 2004.

Additionally issues on base conditions, economics, public access, and parking, are already discussed above in your original letter. Storm impacts are discussed in the Coastal Appendix of the EA.

**5.23 Dr. Douglas J. Wakeman, Professor of Economics, Meredith College, letter dated June 2, 2003.**

**General Comment:** I have read the "Draft Evaluation Report and Environmental Assessment, Morehead City Harbor, Section 933, Carteret County, North Carolina, May 2003" and offer the following comments regarding the conclusions drawn with regard to the economic benefits and costs of the project.

In general, it is my professional opinion that the document fails to provide an economically valid or reliable basis for conclusions regarding the benefits of the project, and that therefore the economic conclusions drawn must be regarded as, at best, speculative. This opinion is based upon the following considerations:

**Response:** See our responses to the 8 comments below.

**Comment 1.** Failure to fully assess the in-progress locally-financed project: if I recall correctly, the project currently underway in this area with local financing was purported to provide 8-10 years of storm protection. If it IS performing as promised, then much of the storm protection claimed for the 933 project is attributable to the existing project, and should not be counted again as benefits for the 933 project. If the current project IS NOT performing as promised by USACE and the local sponsors, then it remains to be shown (1) why that (almost immediate) failure has occurred, and, (2) how/why the design of the 933 project differs in such ways that the failure will not be repeated. Otherwise, the economic analyst has no choice to presume that the 933 project will also fail almost immediately, thereby eliminating most of the claimed future benefits.

**Response:** The proposed 933 project considered the locally financed project in place and as part of the without project condition. Benefits were computed for the 933 project as compared to the without project condition, which included all proposed locally-financed nourishment.

**Comment 2.** Inadequate analysis of severe storm events: the discussion (and presumably, analysis) of major storm events is limited to categories 1 and 2. This omission is presumably justified by the fact that neither the existing beach nor the augmented beach provide much protection against the larger, more damaging storms, and therefore the augmentation would provide no benefit to analyze. What's missing is the possibility that a Category 4 or 5 storm could destroy many of the structures as well as much of the



augmented beach, leaving no protection at all against future storms of any category, and thereby reducing the benefits of the project to essentially zero, thereafter. [Obviously, this line of reasoning contradicts the notion expressed in the document that short-term storm-damage to beaches quickly re-equilibrates to pre-existing conditions and contours; but if that reasoning is correct, how is it that we're still trying to "correct" damage that occurred in 1996?]

**Response:** The project analysis accounted for the probable occurrence of all expected storms, including category 4 and 5 hurricanes. The loss of beach in an extreme storm would reduce storm damages as compared to the loss of structures and infrastructure.

**Comment 3.** Inappropriate period for analysis: one searches in vain for any serious, substantive justification for analyzing a 10-year project over a 20-year period. One supposes that it might be argued that simply by delaying until 2015-2024 the damage that otherwise would have occurred during 2005-2014 there is a gain in present value. (That's true, but it's also true that the gain would be small.) If that is the reason for the 20-year observation period, it should be made explicit, and data presented so that the reader may verify that this indeed is what has been done. If there is some other reason for the 20-year observation period, then that should be presented. Otherwise, it must be concluded that the doubling of the observation period is both arbitrary and capricious, and that estimated benefits are therefore too large by a factor of 2.

**Response:** The period of analysis of 20 years was selected to take into account the expected life of the nourishment of 10 years and any immediate impacts in the period after the fill is expected to be gone. Both the with and without project conditions were evaluated over the same period of analysis. At an interest rate of 5 7/8 percent, a dollar of damage in year 10 has a present worth of only 56 cents as compared to a dollar of damage in the base year.

**Comment 4. Inadequate analysis of recreational benefits:** the valuation of recreational benefits is highly speculative, for several reasons: (a) the unit day-value lacked theoretical justification when it was first adopted some 40 years ago, and is now quite hopelessly obsolete; estimates based on this method are presumed to be completely lacking in economic validity; (b) the number of people using the beach can be estimated far more reliably than by aerial photographs; given the simplicity (and low cost) of simply sending an observer to the beach to count the people on the beach at various times on various days, the use of the far-less-direct aerial observance is simply not good science; (c) similarly, the estimates of room occupancy, conjoined with the assumption that every dweller in every room goes to the beach, perhaps contains an upward bias. Taking these deficiencies together, one is forced to conclude that the analysis of recreational benefits (as presented) is seriously biased and unreliable, and should not play any role in evaluating the 933 project. [One also notes that the language in the enabling statute refers explicitly to storm damage, but makes no mention of recreational value. A compelling legal case could be made that recreational value has no legal standing in a 933 analysis.]

**Response:** The proposed 933 project provides net economic benefits based solely on expected reductions in storm damages. The limitations in the unit-day value methods are known, but Principles and Guidelines allow it to be used under certain conditions, which this project meets. We understand that beach use on an annual basis

varies greatly from day to day and season to season, but wanted to obtain some aerial photographs on July 4 to give us some information on the magnitude of beach use. The photographs, combined with motel occupancy data and traffic counts at the two bridges, help us estimate expected recreation use with and without the proposed 933 project. We will continue to gather additional recreation data on Bogue Banks as part of our ongoing studies in the region.

**Comment 5.** Contents value: the assumption that contents of commercial structures are valued at 50% of the structures' value is another empirical issue that could easily be verified by actual survey of actual commercial structures, rather than relying on local expert opinion. To rely on opinion when data can so easily be gathered is simply not acceptable procedure.

**Response:** We believe that the values we used were reasonable and properly determined, and tested the sensitivity of using lower content values, with little change in benefits.

**Comment 6.** Excess burden of taxation: although USACE procedures do not require it, sound economic analysis of economic benefits and costs requires consideration of the benefit reductions caused by the behavioral alterations caused by the use of taxation to finance projects. As per OMB suggestion, the analyst should increase cost estimates by about 25% to account for this effect; this adjustment results in a substantial reduction on net benefits.

**Response:** This concept is not reflected in either the Water Resources Council's Principles and Standards or the Corps' Principles and Guidelines. OMB has not asked the Corps to include this type of adjustment in their communications with us. There are also arguments that the discount rate should be lower to remove the expectation of inflation from the rates paid on US treasury bills, which would increase project net benefits.

**Comment 7.** Linear loss of land value: it is assumed that land's loss of value is linear with the loss of area (i.e., that every 1% reduction in area produces a 1% loss of value); further, it is asserted that this assumption is "reasonable and non-subjective." It may be indeed be reasonable, but it is absolutely subjective, insofar as many other relationships are both possible and reasonable. For instance, it is also reasonable to believe that small changes in area are largely unnoticed by the market as long as the lot remains (re) buildable, followed by a very large loss of value for the potentially very small loss of land that takes away the ability to build and/or rebuild. Which is correct? Once again, as we say in economics, that's an empirical question, to be answered not by theory but by statistical research. Otherwise, the choice is wholly subjective, and results based thereupon must be regarded as speculation.

**Response:** The guidance provides that we use near-shore land values rather than ocean front values in our land losses and benefits. Since the nearshore land is lost as the ocean erodes the shoreline, computing this on an as accrued basis seemed most reasonable. Other methods would provide similar results.

**Comment 8:** Taking all of these issues into account, it appears that the analysis as presented provides no sound economic basis for a conclusion regard the net economic benefits of the Morehead City 933 project. It is my belief that if all of these issues were

fully and appropriately addressed, that the resulting net economic benefits would be far lower than as presented in the document, and quite possibly negative. Sound public policy demands that no action be taken pending correction of these deficiencies.

**Response:** We believe that the analyses performed are appropriate to the question being decided (Whether the Federal Government should participate in placing material from Brandt Island along a greater length of Bogue Banks?). The added cost is greatly exceeded by the expected additional benefits.

**5.24 Mr. T. B. Doe, III, letter dated May 8, 2003.**

**Comment 1:** This is in reference to your above titled May 2, 2003 document. Be advised that page 2, second paragraph, sentence three is in error. The notice specifically states, "...the proposed project is consistent with ..... the land use plan for..... Towns of Atlantic Beach....." In fact, the proposed 933 project is in direct violation of the approved 1993 Town of Atlantic Beach Land Use Plan. Specifically, the Atlantic Beach Land Use Plan makes three references to the long standing disposal of Beaufort Inlet and Harbor spoils on Atlantic Beach.

- Page 1-71, (i) Excessive Erosion Areas.

"Numerous spoil projects performed by the U. S. Army Corps of Engineers as a result of dredging projects around the State Port have preserved the Atlantic Beach ocean shoreline. The sand utilized for the spoil was obtained from dredging projects in Beaufort Inlet and Bogue Sound."

- Page IV-6, Ocean Hazard Areas: (b)

"Atlantic Beach supports the deposit of dredge spoil by the U.S. Army Corps of Engineers on the beach and relocation as the preferred erosion control measures for ocean hazard areas."

- Page IV-7, Ocean Hazard Areas: (e)

"Atlantic Beach will support the limited adjustment of the CAMA setback line in association with ongoing deposit of sand from dredge spoil projects and the establishment of new permanent dune and vegetation lines. However, it is understood that this policy will not impact permit decisions regarding CAMA setback line in ocean hazard areas unless the Coastal Resources Commission modifies the State use standards for this AEC."

These three sections of the document clearly tie into the ongoing placement of inner harbor spoils on Atlantic Beach. Transfer of more than 70% of the spoils required to continue this plan, elsewhere, to supply sand for the 933 project, clearly violates Atlantic Beach's Land Use Plan. A 933 plan that builds itself by taking the sand supporting Atlantic Beach's Land Use Plan must be rejected as not "consistent to the maximum extent.....".

**Response:** We disagree. We were unable to find any reference in the above mentioned land use plans, that the proposed Section 933 project would be inconsistent with the Atlantic Beach Land Use Plan if a certain percentage (i.e., 70% or any other

percentage, see Mr. Doe's above comment) of maintenance material taken from the pumpout of Brandt Island or Morehead City Harbor navigation channels is not placed and retained on Atlantic Beach.

The last time that the Corps pumped out Brandt Island was in FY 1994. Approximately 2.5 million cubic yards of dredged material was pumped out of Brandt Island and placed on Bogue Banks from Fort Macon State Park to Pine Knoll Shores. By letter dated April 22, 1993, the NC Department of Environment, Health, and Natural Resources, Division of Coastal Management determined that the project was consistent with the enforceable policies and standards of the North Carolina Coastal Management Program (see US Army Corps of Engineers, Wilmington District. Finding of No Significant Impact, Disposal of Dredged Material on the Ocean Beach of Bogue Banks from the Combined Maintenance Dredging and Deepening of Morehead City Harbor Inner Harbor Navigation Channels, Bulkhead Channel, U.S. Navy LST Ramp, and Pumpout of Brandt Island Upland Diked Disposal Site, Carteret County, North Carolina. April 1993). By letter dated March 4, 1993 (enclosed in this FONSI dated April 1993), Mr. Bruce C. Payne, Town Planner for Atlantic Beach did not indicate that the placement of dredge maintenance material onto Bogue Banks from Fort Macon State Park to Pine Knoll Shores was inconsistent with the Town's Land Use Plan. Moreover, Mr. Payne's letter did not mention anything about the alleged requirement of 70% (or any other percentage) of the dredge material pumped onto Bogue Banks should be placed on Atlantic Beach.

By letter dated July 18, 2003 (copy found in Appendix 2), the North Carolina Department of Environment and Natural Resources, Division of Coastal Management agreed with the Wilmington Districts' determination that the proposed activity is consistent with the North Carolina Coastal Management Program to the maximum extent practicable providing that the five conditions mentioned in this letter were satisfied. The Wilmington District will comply with these conditions.

## **6.00 THREATENED AND ENDANGERED SPECIES**

The EA includes a determination that the proposed Section 933 project will not adversely affect or threaten the continued existence of threatened and endangered species and is in compliance with Section 7 of the Endangered Species Act of 1973, as amended. The EA was provided to USFWS and NMFS on May 2, 2003.

Requirements for Section 7 of the Endangered Species Act of 1973, as amended have been met. The project is covered under a USFWS Biological Opinion dated July 22, 2003 and a NMFS Regional Biological Opinion dated 1997. All reasonable and prudent measures, as well as all terms and conditions of the USFWS Biological Opinion dated July 22, 2003 (see Appendix 2) and the NMFS Regional Biological Opinion dated 1997 (see letter dated June 13, 2003 from NMFS found in Appendix 2) will be complied with.

## **7.00 COMPLIANCE WITH ENVIRONMENTAL REQUIREMENTS.**

**7.01 Water Quality.** A Section 404 (b)(1) evaluation was completed and is found in the referenced EA. A Section 401 Water Quality Certificate from the NC Division of Water Quality is required before the Section 933 work proceeds.

**7.02 Air Quality.** The project is in compliance with Section 176 (c) of the Clean Air Act, as amended (CAA). The Wilmington Regional Office of the North Carolina Department of Environment and Natural Resources has air quality jurisdiction for the project area. The ambient air quality for Carteret County has been determined to be in compliance with the National Ambient Air Quality Standards, and this county is designated as an attainment area (Personal Communication, 11 March 02, Brad Newland, Engineer, NC Division of Air Quality). The direct and indirect emissions from the project fall below the prescribed de minimus levels; therefore, this project is not anticipated to create any adverse effect on the air quality of this attainment area.

**7.03 Cultural Resources.** The US Army Corps of Engineers, Wilmington District, in consultation with the NC Division of Archives and History Underwater Archaeology Unit, have considered both the potential impact of the project and the nature of the known resources, and have determined that the information does not support a recommendation for an archaeological survey of the entire beach area. However, it is possible during the course of construction that vessel remains will be encountered. Therefore, the Underwater Archaeology Unit has requested that Wilmington District personnel, contractors, and others be aware that the possibility exists that this work may unearth a beached shipwreck. In the event that such occurs, work should move to another area and the Underwater Archaeology Unit should be contacted immediately. A staff member will be sent to assess the wreckage and, if practical, undertake appropriate documentation.

**7.04 Executive Order 11988 (Flood Plain Management).** Dredged maintenance material will be placed in the flood plain. The proposed action is not anticipated to induce development of the floodplain, or to otherwise adversely affect any floodplain, since the existing oceanfront property is already developed. The proposed action is in compliance with the requirements of Executive Order 11988.

**7.05 Executive Order 11990 (Protection of Wetlands).** The work will not require filling any wetlands. The proposed work will not produce any significant hydrologic or salinity changes affecting any wetlands. The proposed action is in compliance with Executive Order 11990.

**7.06 Executive Order 11593 (Protection and Enhancement of the Cultural Environment).** The proposed plan has been evaluated under Executive Order 11593, and it is not an undertaking affecting potential National Register sites.

**7.07 Executive Order 12898 (Federal Actions to Address Environmental Justice in Minority Populations and Low Income Communities and Low Income Populations).** The Proposed Action is not expected to disproportionately impact minority communities or low-income populations.

**7.08 Executive Order 13405 (Protection of Children From Environmental Health Risks).** This order mandates Federal agencies identify and assess environmental health and safety risks that may disproportionately affect children as a result of the implementation of federal policies, programs, activities, and standards (63 Federal Register 19883-19888). The Proposed Action would not impact schools or housing areas. The beaches at Bogue Banks are considered a gathering place for children. However, the actual beach construction zone would be fenced off and monitored by the contractor. No unauthorized individuals will be allowed within the work zone. Therefore, there would be no short- or long-term impacts on the health and safety of children.

**7.09 Executive Order 13186 (Protection of Migratory Birds).** This Executive Order mandates agencies to protect and conserve migratory birds and their habitats. The proposed action will not have a measurable negative affect on migratory bird populations. In fact the proposed action would restore and increase the riparian habitat along Bogue Banks beaches for migratory birds. Migratory birds may also use Brandt Island for foraging, nesting, and roosting habitat. If the proposed action extends into the waterbird nesting season (1 April to August 31 of any year), we will work with representatives of NCWRC to reduce impacts to nesting waterbirds.

#### **7.10 North Carolina Coastal Management Program**

The project will take place in the designated coastal zone of the State of North Carolina. Pursuant to the federal Coastal Zone Management Act (CZMA) of 1972, as amended (P.L. 92-583), federal activities are required to be consistent to the maximum extent practicable with the federally approved coastal management program of the state in which their activities would be occurring. We believe that the Section 933 project is consistent with the North Carolina Coastal Management Program for the following reasons: 1. The dredge material found within Brandt Island and the Morehead City Harbor channels is compatible (See response to Comment 11: EFH Recommendations 3 within the NMFS letter (5.05) dated June 5, 2003, above), 2. Both the USFWS and NMFS indicated that the proposed action will not adversely affect endangered species, 3. Literature dating back to the early 1970's along the southeast coast indicate that opportunistic infauna species (ex. *Emerita* and polychaetes) found in the nourished areas are subject to direct mortality from burial, however, recovery often occurs between 1 to 3 years depending on sediment compatibility and the relationship of nourishment placement to recruitment timeframes (Hayden and Dolan, 1974; Saloman, 1984; Nelson, 1989; Van Dolah et al., 1992; Van Dolah et al., 1993; Hackney et al. 1996; P.C. Jutte et al., 1999). Therefore, a minimum three-year recovery period is not

required. 4. The revised construction window is from November 1, 2003 to April 30, 2004 (to May 31, 2004, if required), and 5. Carteret County has agreed to continue monitoring the Phase 1 area (Pine Knoll Shores to Indian Beach (including Salter Path)) beyond November 2003, if adequate recovery of mole crabs and coquina clams does not occur. If required the monitoring would be extended to November 2004. Please note if the Section 933 project is not funded, Carteret County **will not** extend the monitoring until November 2004. .

By letter dated July 18, 2003 (copy found in Appendix 2), the North Carolina Department of Environment and Natural Resources, Division of Coastal Management agreed with the Wilmington Districts' determination that the proposed activity is consistent with the North Carolina Coastal Management Program to the maximum extent practicable providing that the five conditions mentioned in this letter were satisfied. The Wilmington District will comply with these conditions.

## **8.00 ENVIRONMENTAL IMPACTS**

No unacceptable adverse effects on water resources (surface and groundwater), aquatic resources, terrestrial resources, wetlands and flood plains, threatened and endangered species, cultural resources, aesthetic and recreational resources, and socioeconomic resources are expected to occur as a result of the proposed project. The majority of the comments received during the coordination of the project indicate that the document adequately addresses the resources in the project area and the potential project-related impacts to those resources.

## **9.00 ENVIRONMENTAL COMMITMENTS**

The following commitments will be followed:

1. A sea turtle nest-monitoring program will be implemented during construction if dredging and disposal occur during sea turtle nesting season on the beach from November 1 to November 15, 2003 and May 1 to May 31, 2004. If work takes place from November 1 to November 15, 2003 and from May 1 to May 31, 2004, the Wilmington District will be responsible for monitoring the construction area and will relocate any sea turtle nests. During the period of sea turtle nesting and hatching (November 1 to November 15, 2003 and May 1 to May 31, 2004), all lighting associated with project construction shall be minimized to the maximum extent practicable while maintaining compliance with all safety requirements. Reduced wattage and special fixtures or screens to reduce illumination of adjacent beach and near shore waters shall be used if practical. Lighting on offshore equipment shall also be minimized to the maximum extent practical while meeting Coast Guard requirements. Shielded low-pressure sodium vapor lights are highly recommended for all lights on the beach or on offshore equipment.

2. Monitor the beaches on Bogue Banks (from Fort Macon State Park to Indian Beach (including Salter Path) for escarpment formation following the placement of dredged material during construction and prior to the first turtle-nesting season (May 1, 2004), and will level the escarpment (if the escarpment exceeds 18 inches in height and 100 feet in length for a period of 48 hours). All beaches that have received dredged material will be tilled to a depth of 36-inches, prior to May 1, 2004. In order to avoid sea turtle nests, no tilling or leveling of escarpments will take place after May 1, 2004.

3. Should a hydraulic pipeline dredge be used offshore, the pipeline from the navigation channels to the disposal beach will be submerged until it reaches nearshore waters. The pipeline would be marked to let commercial and recreational boaters know of its presence along the bottom. Work barges and other appurtenances associated with a pipeline dredge operating in open water would be moored so as to minimize interference with boat traffic in the area.

4. There will be some loss of dune vegetation where the pipeline crosses the dune to the beach. Plants growing adjacent to the seaward side of the dunes will be buried by the discharge of dredged material. Dune vegetation disturbed by the pipeline crossing to the beach will be restored to pre-project grade and replanted following project completion. Planting stocks shall consist of sea oats and American beachgrass. The vegetative cover shall extend from the landward to the seaward toe of the dune. American beachgrass will be the predominant plant with sea oats as a supplemental plant. Planting would be accomplished during the season best suited for the particular plant.

5. Within Morehead City Harbor, some of the navigational channels are closed to shellfish harvesting. By Memorandum dated January 31, 2002, from the North Carolina Department of Environment and Natural Resources, Division of Environmental Health, Shellfish Sanitation and Recreational Water Quality Section (see Attachment B), if maintenance material is excavated from these closed shellfishing areas between May 1 and October 31 and placed on Bogue Banks a swimming advisory will be posted and a press release made. The Wilmington District will notify the Shellfish Sanitation and Recreational Water Quality Section prior to dredging from a closed shellfishing area with placement on a recreational swimming area.

6. Only beach compatible material will be placed on Bogue Banks from either the pumpout of Brandt Island or the maintenance dredging of the Morehead City Harbor navigation channels. We will include the following paragraph in the proposed Section 933 specifications, *"Materials: The dredging shall be accomplished so that the most suitable material available for beach disposal is placed within the prescribed section. Suitable materials shall be comprised of materials by ASTM D 2487 as SP, SP-SM, and SW. This material shall be predominantly of sand grain size with no more than 10% silt, shell, and clay material present. Should the dredge*



*encounter materials not suitable for placement on the beach, the Contractor will be directed by the Contracting Officer to move to a more satisfactory location within Brandt Island or the navigation channels."*

7. To the maximum extent practicable and during the warmer months, we will try to reduce direct impacts to intertidal macrofauna (mole crabs and coquina clams) by relocation to completed portions of the beach.

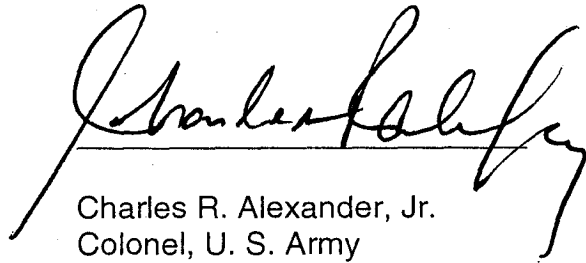
8. As indicated during our inter agency meeting on June 24, 2003, a representative from Carteret County stated that they would continue monitoring the Phase 1 area (Pine Knoll Shores to Indian Beach (including Salter Path)) beyond November 2003, if adequate recovery of mole crabs and coquina clams does not occur. If required the monitoring would be extended to November 2004. Please note if the Section 933 project is not funded, Carteret County **will not** extend the monitoring until November 2004.

## 10.00 FINDING OF NO SIGNIFICANT IMPACT

No unacceptable adverse effects on water and aquatic resources, terrestrial resources, wetlands and floodplains, threatened and endangered species, cultural resources, recreational resources, recreational fishing, or socioeconomic resources are expected to occur as a result of the proposed project. Based on the EA, referenced previously, the recommended plan will not significantly affect the quality of human environment; therefore, this action will not be subject of an environmental impact statement.

Date: \_\_\_\_\_

8/15/03



Charles R. Alexander, Jr.  
Colonel, U. S. Army  
District Engineer

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## APPENDIX 1

Final Evaluation of Section 404(b) (1) Guidelines 40 CFR 230





# MOREHEAD CITY HARBOR SECTION 933 CARTERET COUNTY, NORTH CAROLINA

## Final Evaluation of Section 404 (b) (1) Guidelines 40 CFR 230

This evaluation covers the placement of all fill material into waters and wetlands of the United States required for construction of the Morehead City Harbor Section 933, Carteret County, North Carolina.

Section 404 Public Notice No. CESA-W-TS-PE-03-16-0002

- |    |   | Preliminary <u>1</u> /                                     | Final <u>2</u> /  |
|----|---|--|---|
| 1. | <u>Review of Compliance (230.10(a)-(d))</u><br>A review of the NEPA Document indicates that:  |  |   |
| a. | The discharge represents the least environmentally damaging practicable alternative and if in a special aquatic site, the activity associated with the discharge must have direct access or proximity to, or be located in the aquatic ecosystem to fulfill its basic purpose (if no, see section 2 and NEPA document);   | YES <input type="checkbox"/> NO <input type="checkbox"/>   | YES <input checked="" type="checkbox"/> NO <input type="checkbox"/> |
| b. | The activity does not:<br>1) violate applicable State water quality standards or effluent standards prohibited under Section 307 of the CWA; 2) jeopardize the existence of federally listed endangered or threatened species or their habitat; and 3) violate requirements of any federally designated marine sanctuary (if no, see section 2b and check responses from resource and water quality certifying agencies); | YES <input type="checkbox"/> NO <input type="checkbox"/> * | YES <input checked="" type="checkbox"/> NO <input type="checkbox"/> |
| c. | The activity will not cause or contribute to significant degradation of waters of the U.S. including adverse effects on human health, life stages of organisms dependent on the aquatic ecosystem, ecosystem diversity, productivity and stability, and recreational, aesthetic, and economic values (if no, see section 2);  | YES <input type="checkbox"/> NO <input type="checkbox"/>   | YES <input checked="" type="checkbox"/> NO <input type="checkbox"/> |
| d. | Appropriate and practicable steps have been taken to minimize potential adverse impacts of the discharge on the aquatic ecosystem (if no, see section 5).   | YES <input type="checkbox"/> NO <input type="checkbox"/> * | YES <input checked="" type="checkbox"/> NO <input type="checkbox"/> |

Proceed to Section 2

\*, 1, 2/ See page 6.

## 2. Technical Evaluation Factors (Subparts C-F)

N/A

Not Significant

Significant

### a. Physical and Chemical Characteristics of the Aquatic Ecosystem (Subpart C)

- (1) Substrate impacts.
- (2) Suspended particulates/turbidity impacts
- (3) Water column impacts.
- (4) Alteration of current patterns and water circulation.
- (5) Alteration of normal water fluctuations/hydroperiod.
- (6) Alteration of salinity gradients.

	X	
	X	
	X	
	X	
	X	
NA		

### b. Biological Characteristics of the Aquatic Ecosystem (Subpart D)

- (1) Effect on threatened/endangered species and their habitat.
- (2) Effect on the aquatic food web.
- (3) Effect on other wildlife (mammals, birds, reptiles, and amphibians).

	X	
	X	
	X	

### c. Special Aquatic Sites (Subpart E)

- (1) Sanctuaries and refuges.
- (2) Wetlands.
- (3) Mud flats.
- (4) Vegetated shallows.
- (5) Coral reefs.
- (6) Riffle and pool complexes.

NA		
NA		
NA		
NA		
NA		
NA		

### d. Human Use Characteristics (Subpart F)

- (1) Effects on municipal and private water supplies.
- (2) Recreational and commercial fisheries impacts
- (3) Effects on water-related recreation.
- (4) Aesthetic impacts.
- (5) Effects on parks, national and historical monuments, national seashores, wilderness areas, research sites, and similar preserves.

NA		
	X	
	X	
	X	
	X	

Remarks: Where a check is placed under the significant category, preparer add explanation below.

Proceed to Section 3

\*See page 6.

3. Evaluation of Dredged or Fill Material (Subpart G) 3/

a. The following information has been considered in evaluating the biological availability of possible contaminants in dredged or fill material. (Check only those appropriate.)

- (1) Physical characteristics ..... ☒
- (2) Hydrography in relation to known or anticipated sources of contaminants ..... ☒
- (3) Results from previous testing of the material or similar material in the vicinity of the project ..... ☒
- (4) Known, significant sources of persistent pesticides from land runoff or percolation ..... ☐
- (5) Spill records for petroleum products or designated (Section 311 of CWA) hazardous substances ..... ☐
- (6) Other public records of significant introduction of contaminants from industries, municipalities, or other sources ..... ☐
- (7) Known existence of substantial material deposits of substances which could be released in harmful quantities to the aquatic environment by man-induced discharge activities ..... ☐
- (8) Other sources (specify)..... ☐

List appropriate references.

Reference: Finding of No Significant Impact, Morehead City Harbor Section 933, Carteret County, North Carolina, dated August 2003.

- b. An evaluation of the appropriate information in 3a above indicates that there is reason to believe the proposed dredge or fill material is not a carrier of contaminants, or that levels of contaminants are substantively similar at extraction and disposal sites and not likely to result in degradation of the disposal site.\*\*

YES ☒ NO ☐\*

Proceed to Section 4

\*, 3/, see page 6.

4. Disposal Site Determinations (230.11(f)).

a. The following factors as appropriate, have been considered in evaluating the disposal site.

- (1) Depth of water at disposal site ..... ☒
- (2) Current velocity, direction, and variability at disposal site ..... ☒
- (3) Degree of turbulence ..... ☒
- (4) Water column stratification ..... ☒
- (5) Discharge vessel speed and direction ..... ☒
- (6) Rate of discharge..... ☒
- (7) Dredged material characteristics (constituents, amount and type of material, settling velocities)..... ☒
- (8) Number of discharges per unit of time..... ☒
- (9) Other factors affecting rates and patterns of mixing (specify)

List appropriate references.

Reference: Finding of No Significant Impact, Morehead City Harbor Section 933, Carteret Count, NC.

b. An evaluation of the appropriate factors in 4a above indicates that the disposal site and/or size of mixing zone are acceptable.

YES ☒ NO ☐\*

5. Actions to Minimize Adverse Effects (Subpart H).

All appropriate and practicable steps have been taken, through application of recommendations of 230.70-230.77, to ensure minimal adverse effects of the proposed discharge. List actions taken.

YES ☒ NO ☐\*

See Environmental Assessment and Finding of No Significant Impact.

Return to section 1 for final stage of compliance review. See also note 3/, page 3.

\*See page 6.

6. Factual Determinations (230.11).

A review of appropriate information as identified in items 2-5 above indicates that there is minimal potential for short- or long-term environmental effects of the proposed discharge as related to:

- |   |   |
|---|---|
| a. Physical substrate at the disposal site<br>(review sections 2a, 3, 4, and 5).      | YES <input checked="" type="checkbox"/> NO <input type="checkbox"/> |
| b. Water circulation, fluctuation, and salinity<br>(review sections 2a, 3, 4, and 5). | YES <input checked="" type="checkbox"/> NO <input type="checkbox"/> |
| c. Suspended particulates/turbidity<br>(review sections 2a, 3, 4, and 5).             | YES <input checked="" type="checkbox"/> NO <input type="checkbox"/> |
| d. Contaminant availability<br>(review sections 2a, 3, and 4).                        | YES <input checked="" type="checkbox"/> NO <input type="checkbox"/> |
| e. Aquatic ecosystem structure and function<br>(review sections 2b and c, 3, and 5).  | YES <input checked="" type="checkbox"/> NO <input type="checkbox"/> |
| f. Disposal site<br>(review sections 2, 4, and 5).                                    | YES <input checked="" type="checkbox"/> NO <input type="checkbox"/> |
| g. Cumulative impact on the aquatic<br>ecosystem.                                     | YES <input checked="" type="checkbox"/> NO <input type="checkbox"/> |
| h. Secondary impacts on the aquatic<br>ecosystem.                                     | YES <input checked="" type="checkbox"/> NO <input type="checkbox"/> |

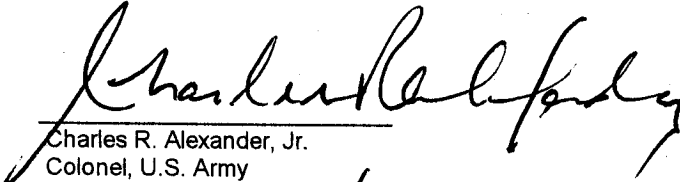
7. Findings.

- a. The proposed disposal site for discharge of dredged or fill material complies with the Section 404(b)(1) guidelines. . . . . ☒
- b. The proposed disposal site for discharge of dredged or fill material complies with the Section 404(b)(1) guidelines with the inclusion of the following conditions: . . . . . ☐
- c. The proposed disposal site for discharge of dredged or fill material does not comply with the Section 404(b)(1) guidelines for the following reasons(s):
- (1) There is a less damaging practicable alternative . . . . . ☐
- (2) The proposed discharge will result in significant degradation of the aquatic ecosystem . . . . . ☐

\*See page 6.

- (3) The proposed discharge does not include all practicable and appropriate measures to minimize potential harm to the aquatic ecosystem. . . . . ☐

8.

  
\_\_\_\_\_  
Charles R. Alexander, Jr.  
Colonel, U.S. Army  
District Engineer

Date: 8/15/03

\*A negative, significant, or unknown response indicates that the permit application may not be in compliance with the Section 404(b)(1) Guidelines.

1/ Negative responses to three or more of the compliance criteria at this stage indicate that the proposed projects may not be evaluated using this "short form procedure." Care should be used in assessing pertinent portions of the technical information of items 2 a-d, before completing the final review of compliance.

2/ Negative response to one of the compliance criteria at this stage indicates that the proposed project does not comply with the guidelines. If the economics of navigation and anchorage of Section 404(b)(2) are to be evaluated in the decision-making process, the "short form evaluation process is inappropriate."

3/ If the dredged or fill material cannot be excluded from individual testing, the "short-form" evaluation process is inappropriate.

## APPENDIX 2

### Letters Received During the 30-Day Review and Comment Period







UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 4  
ATLANTA FEDERAL CENTER  
61 FORSYTH STREET  
ATLANTA, GEORGIA 30303-8960

MAY 13 2003

District Engineer  
Wilmington District, Corps of Engineers  
P.O. Box 1890  
Wilmington, NC 28402-1890  
Attention: Mr. Hugh Heine (CESAW-TS-PE)

Subject: **Environmental Assessment (EA) and Finding Of No Significant Impact (FONSI) for Morehead City Harbor (Section 933), Carteret County, NC (dtd. May, 2003)**

Dear Sir:

Pursuant to Section 309 of the Clean Air Act, EPA, Region 4 has reviewed the subject document, an evaluation of the environmental consequences of placing dredged material from the Morehead City Harbor and the Brandt Island Upland Diked Disposal Area onto the Bogue Banks Beaches, viz., Atlantic Beach, Pine Knoll Shores, and Indian Beach. The subject beaches (13 miles in extent) will receive up to 6.3 million cubic yards of material from the two noted project sites. A berm system 30-feet wide at +7 NGVD will be constructed on a 1:25 slope in this one-time operation.

EPA has previously commented to the District on the overall advisability of pumping sand onto an eroding shore face. Generally, we have not had significant concerns about beach nourishment when it provides a disposal site for a proximate, already authorized navigation project. However, the more operative factor was whether or not biologically sensitive resources would be adversely affected through the use of this disposal option. In this particular case the value of the impacted natural resources which will be inundated do not appear compelling and/or at long-term risk. On the other hand, the declining width of the recreational beach, the storm protection potential afforded adjacent shore front property owners, and the acceptable expense of this disposal option appear to counter balance any unavoidable effects accruing from this proposal.

As a result, we have no substantive objections with the FONSI determination that an environmental impact statement is not necessary to evaluate the project. Thank you for the opportunity to comment. If we can be of further assistance, Dr. Gerald Miller (404-562-9626) will serve as initial point of contact.

Sincerely,

A handwritten signature in dark ink, appearing to read "H. Mueller".

Heinz J. Mueller, Chief  
Office of Environmental Assessment

United States Department of Agriculture



Natural Resources Conservation Service  
4405 Bland Road, Suite 205  
Raleigh, NC 27609

State Conservationist  
Telephone No.: (919) 873-2101  
Fax No.: (919) 873-2156  
Email: mary.combs@nc.usda.gov

---

May 15, 2003


Mr. Hugh Heine  
CESAW-TS-PE  
Environmental Resources Section  
U. S. Army Engineer District, Wilmington  
P. O. Box 1890  
Wilmington, NC 28402-1890

Dear Mr. Heine:

Thank you for the opportunity to provide comments on Draft Evaluation Report and Environmental Assessment, Morehead City Harbor Section 933, Carteret County, North Carolina.

The Natural Resources Conservation Service does not have any comments at this time. If you should have any questions, please contact Mike Hinton at (919) 873-2134.

Sincerely,

  
Mary K. Combs  
State Conservationist



DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

Centers for Disease Control  
and Prevention (CDC)  
Atlanta GA 30333

May 19, 2003

W. Coleman Long  
Chief Planning and Environmental Branch  
Wilmington District  
US Army Corps of Engineers  
PO Box 1890  
Wilmington, North Carolina 28402-1890

Dear Mr. Long:

We appreciate the opportunity to review the Draft Evaluation Report and Environmental Assessment (EA) for Morehead City Harbor, Section 933, Carteret County, North Carolina. We are responding on behalf of the U.S. Public Health Service, Department of Health and Human Services (DHHS).

This project will have beneficial effects when completed and we are in overall agreement with its implementation. We believe this EA has adequately addressed the potential human health and safety concerns with one exception. Although we agree with the Corps that the probability of contamination may be low, we still believe that Morehead City inner harbor sediments should be sampled prior to dredging. The cost of running a few samples to verify that there are no human health concerns from potentially contaminated sediments is minimal in relation to the estimated overall project cost of \$16,354,000. We also noted that in response to your January 15, 2002 scoping letter, that the public and other review agencies had also raised a similar concern.

Thank you for the opportunity to review and comment on this document. Please send us a copy of the final document when it becomes available.

Sincerely yours,

A handwritten signature in cursive script, reading "Paul Joe", is positioned above the typed name.

Paul Joe, DO, MPH  
Medical Officer  
National Center for Environmental Health (F16)  
Centers for Disease Control & Prevention



**UNITED STATES DEPARTMENT OF COMMERCE  
National Oceanic and Atmospheric Administration**

NATIONAL MARINE FISHERIES SERVICE

Southeast Regional Office

9721 Executive Center Drive North

St. Petersburg, FL 33702

(727) 570-5312; Fax 570-5517

<http://caldera.sero.nmfs.gov>

JUN 13 2003

F/SER3:DK

Mr. W. Coleman Long  
Chief, Planning and Environmental Branch  
Wilmington District Corps of Engineers  
Department of the Army  
P.O. Box 1890  
Wilmington, NC 28402-1890

Dear Mr. Long:

This correspondence is in reply to the May 2, 2003, letter and accompanying information from the U.S. Army Corps of Engineers (COE), Wilmington District. The COE has requested section 7 consultation from the National Marine Fisheries Service (NOAA Fisheries), pursuant to the Endangered Species Act of 1973 (ESA). The project is the placement of beach quality material from the pumpout of Brandt Island and the maintenance dredging of Morehead City Harbor navigation channels on Bogue Banks. The NOAA Fisheries' consultation number for this project is I/SER/2003/00567; please refer to this number in future correspondence on this project.

The COE is proposing to use the beach quality sand collected from the maintenance dredging of Morehead City Harbor and the pumpout of the Brandt Island Upland Diked Disposal Area for beach renourishment on Bogue Banks. The proposed Section 933 (Water Resources Development Act of 1986) project would place this sand along about 70,000 feet (13 miles) of beach from Fort Macon State Park to Indian Beach if the requirements of Section 933 are satisfied. If Section 933 requirements are not satisfied placement will occur only along the base disposal plan area (Fort Macon State Park to Atlantic Beach, a distance of about 6 miles).

ESA-listed species under the purview of NOAA Fisheries which potentially occur in the project area include the green (*Chelonia mydas*), loggerhead (*Caretta caretta*), Kemp's ridley (*Lepidochelys kempii*), leatherback (*Dermochelys coriacea*), and hawksbill (*Eretmochelys imbricata*) sea turtles, and the shortnose sturgeon (*Acipenser brevirostris*). A number of endangered large whale species are known to occur off North Carolina, but are not expected to occur in the project area. No critical habitat has been designated or proposed for listed species within the project area.



The maintenance dredging of the inner harbor and the pumpout of Brandt Island would be performed with a pipeline dredge, while the outer harbor maintenance dredging would be done by a hopper dredge. Pipeline dredging is not known to take sea turtles. When the hopper dredge is used, the project would be authorized under the regional biological opinion (RBO) on hopper dredging by NOAA Fisheries (September 25, 1997, biological opinion to U.S. Army Corps of Engineers, South Atlantic Division, on the continued hopper dredging of channels and borrow areas in the southeastern United States). All terms and conditions included in the RBO will be adhered to by the COE (e.g., observer and reporting requirements, dredging windows), which was reiterated by Mr. Hugh Heine in a May 20, 2003, phone call to NOAA Fisheries. Any incidental take of sea turtles resulting from the operation of hopper dredges by the COE's South Atlantic Division is authorized under the Incidental Take Statement (ITS) of that biological opinion, and such take would be counted toward the total allowable take in that ITS. Year to date, 6 loggerheads have been taken under the ITS for the South Atlantic coast hopper dredging RBO. The total take limit for the year is 35 loggerhead, 7 green, 7 Kemp's ridley, and 2 hawksbill sea turtles, as well as 5 shortnose sturgeon.

As stated above, pipeline dredging is not known to take sea turtles, and hopper dredging would be covered under the hopper dredging RBO. The placement of dredged material onto the Bogue Bank beaches would not have a direct impact on sea turtles in water, and would not have a substantial impact on sea turtle foraging habitat. Nesting-related impacts from beach renourishment fall under the purview of the U.S. Fish and Wildlife Service, which must be consulted regarding this aspect of the project. Turbidity resulting from the dredging and the spoil placement would be temporary and minimal. Shortnose sturgeon are not known to occur in the project area. NOAA Fisheries, therefore, believes that the proposed action is not likely to adversely affect any listed species under our purview.

This letter concludes the COE's consultation responsibilities under section 7 of the ESA for the proposed actions for federally-listed species, and their critical habitat, under NOAA Fisheries' purview. A new consultation should be initiated if there is a take, new information reveals impacts of the proposed actions that may affect listed species or their critical habitat, a new species is listed, the identified action is subsequently modified, or critical habitat is designated that may be affected by the proposed activity.

The action agency is also reminded that, in addition to its protected species/critical habitat consultation requirements with NOAA Fisheries' Protected Resources Division pursuant to section 7 of the ESA, prior to proceeding with the proposed action the action agency must also consult with NOAA Fisheries' Habitat Conservation Division (HCD) pursuant to the Magnuson-Stevens Fishery Conservation and Management Act's requirements for essential fish habitat (EFH) consultation (16 U.S.C. 1855 (b)(2) and 50 CFR 600.905-.930, subpart K). The action agency should also ensure that the applicant understands the ESA and EFH processes; that ESA and EFH consultations are separate, distinct, and guided by different statutes, goals, and time lines for responding to the action agency; and that the action agency will (and the applicant may) receive separate consultation correspondence on NOAA Fisheries letterhead from HCD regarding their concerns and/or finalizing EFH consultation. Consultation is not complete until EFH and ESA concerns have been addressed.

If you have any questions about EFH consultation for this project, please contact Mr. Ron Sechler, HCD, at (252) 728-5090. If you have any questions about this ESA consultation, please contact Dennis Klemm, fishery biologist, at the number above or by e-mail at [Dennis.Klemm@noaa.gov](mailto:Dennis.Klemm@noaa.gov).

Sincerely,

A handwritten signature in black ink, appearing to read 'R E Crabtree', written over the printed name.

Roy E. Crabtree, Ph.D.  
Regional Administrator

cc: F/PR3  
F/SER41-R. Sechler  
COE- SAD, Atlanta - Daniel Small

File: 1514-22 f.1 NC  
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**UNITED STATES DEPARTMENT OF COMMERCE**  
**National Oceanic and Atmospheric Administration**  
NATIONAL MARINE FISHERIES SERVICE  
Southeast Regional Office  
9721 Executive Center Drive North  
St. Petersburg, Florida 33702

June 5, 2003

Colonel Charles R. Alexander, Jr.  
District Engineer, Wilmington District  
Department of the Army, Corps of Engineers  
Regulatory Division  
P. O. Box 1890  
Wilmington, North Carolina 28402-1890

Attention: Coleman Long

Dear Colonel Alexander:

The National Marine Fisheries Service (NOAA Fisheries) has reviewed Public Notice CESAW-TS-PE-03-16-002 (Notice of Availability) and the Draft Environmental Assessment (EA) and Evaluation Report, dated May 2, 2003, for proposed work on Bogue Banks in Carteret County, North Carolina. The U.S. Army Corps of Engineers (COE) proposes to place dredged material from maintenance of the inner and outer harbor navigation channels, and stored at the Brandt Island upland disposal site, on oceanfront beaches of Fort Macon, Atlantic Beach, Pine Knoll Shores, and Indian Beach. Disposal of 1.8 million cubic yards of material is currently authorized for periodic placement along 6 miles of beach at Fort Macon and Atlantic Beach. The proposed Section 933 beneficial use of dredged materials project would extend this disposal area an additional 7.2 miles and authorize placement of 4.5 million cubic yards of material on beaches at Pine Knoll Shores and Indian Beach, which includes Salter Path. A total of approximately 6.3 million cubic yards of material would be placed along a total of 13.2 miles of oceanfront beach on Bogue Banks. A hydraulic pipeline dredge would be used to construct the project and work would begin on November 16, 2003, and continue through April 30, 2005, a total of 16 months.

NOAA Fisheries understands that the project would allow the beneficial use of dredged material and that other beach re-nourishment activities would not be authorized under this authority. We are concerned, however, that adverse impacts to fishery resources for which we have stewardship responsibility, may result. The project would involve disposal of dredged material in marine intertidal and ocean surf zone areas that are designated as Essential Fish Habitat (EFH) for Federally managed species. We note that an EFH Assessment is provided on Pages 36-40 in the EA and, by letter dated May 2, 2003, from the COE, NOAA Fisheries was notified that via transmittal of the EA, the Wilmington District was initiating coordination procedures for EFH as required by the 1996 amendments to the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA)(PL 94-265).



Based on our review of the EFH assessment, we find that EFH and associated managed species found in the project area are adequately described. However, we do not agree with the determination that project related impacts to Federally managed species would be minimal when viewed in connection with other similar and authorized projects in this area. The project would be located in an area identified by the South Atlantic Fishery Management Council (SAFMC) as EFH for red drum, brown shrimp, pink shrimp, and white shrimp. In addition, EFH for king mackerel and Spanish mackerel, is located just offshore of the immediate project area. Categories of EFH for various life history stages of these species include the marine water and ocean surf zone. In addition, tidal inlets such as Beaufort and Bogue inlets, located on the eastern and westernmost ends of the project area, respectively, are designated as Habitat Areas of Particular Concern (HAPC) for shrimp and red drum. EFH for summer flounder and bluefish, which are under jurisdiction of the Mid-Atlantic Fishery Management Council (MAFMC) also occur in the project area. Categories of EFH for these species include marine water column, intertidal areas, and marine bottoms. Other species of commercial, recreational, and ecological importance found in the project area include Atlantic croaker, spot, Atlantic menhaden, striped mullet, and Florida pompano. These species serve as prey for species such as king mackerel, Spanish mackerel, cobia, and others that are managed by the SAFMC, and for highly migratory species (e.g., billfishes and sharks) that are managed by NOAA Fisheries. In addition, pursuant to Section 906(e)(1) of the water Resources Development Act of 1986 (PL 99-602) NOAA Fisheries regards fishery resources impacted by this project and their associated habitats as aquatic resources of "national economic importance".

NOAA Fisheries is concerned that the EA does not adequately consider cumulative impacts to fishery resources that may result from multiple beach nourishment projects on Bogue Banks. The communities of Pine Knoll Shores, Indian Beach and Emerald Isle are currently authorized, via the three phased Bogue Bank Beach Nourishment Project (BBBNP), to place sand along 16.8-miles of beach on Bogue Banks. Beaches at Pine Knoll Shores and Indian Beach were recently impacted by a project that is similar to that being proposed, and similar work is planned for Emerald Isle in 2004. Environmental monitoring of these privately constructed projects indicate that populations of macro-invertebrates and several fish species that inhabit the surf zone of these beaches have not fully recovered. Construction of the proposed Section 933 project, as scheduled, would eliminate any recovery of these species which has taken place at Pine Knoll Shores and Indian Beach. Populations of mole crabs (*Emerita talpoida*) and coquina clams (*Donax variabilis*), which normally occur in the ocean surf zone EFH, are an important components of the aquatic food chain that supports regionally and nationally significant fishery resources. Elimination of these important food sources twice within a three year period could result in significant ecological impacts due to loss of forage organisms for other species; however, we acknowledge that detection of such impacts would be difficult.

Based on the preceding, NOAA Fisheries does not support the determination, as stated in the EA, that continuous dredging and disposal of dredged material on Bogue Banks for 16 months would only minimally impact fishery resources including Federally managed species. Work associated with the BBBNP was restricted to winter months (November 16 to the end of March or April of any year) and the COE Regulatory Division agreed that a seasonal restriction on dredging and disposal of dredged material on the beachfront was appropriate for protection of fishery resources. Consequently, NOAA Fisheries believes the same seasonal work restriction is needed in connection with the proposed Section 933 project.



In connection with the preceding, we further note that Phase I of the BBBNP was constructed between December 2001, and April 2002, and Phase II was constructed between January and March of 2003. Maintenance dredging of navigation channels in and around Morehead City harbor resulted in placement of another 200,000+ cubic yards of material on the Fort Macon shoreline in 2002. The proposed Section 933 project would place up to 6.3 million cubic yards of material on Bogue Banks in 2003, 2004 and, 2005, and Phase III of the BBBNP would immediately follow in the winter of 2004 - 2005. During this four year period, surf zone EFH would be repeatedly impacted and recovery of the macro-invertebrate forage base that supports Federally managed fishes could be negligible over a wide area of Bogue Banks.

The EA also provides no convincing evidence that the project would significantly reduce shoreline erosion and storm damage. The analyses of storm related erosion and damage, both with and without the project, does not adequately consider existing conditions created by Phases I and II of the BBBNP which has widened the beaches at Pine Knoll Shores and Indian Beach. This change has reduced the vulnerability of these locations to storm damage and the EA should be revised to include existing conditions in the "without the project" alternative analysis. Reevaluation of the "without the project" alternative to include the BBBNP could preclude the need for the proposed Section 933 project. In any case, NOAA Fisheries does not believe that the Section 933 project is the least environmentally damaging practical alternative since the cumulative impact to fishery resources over a relatively short period of time may be substantial and is undetermined.

The compatibility of sediments between those found at the Brandt island disposal site and those on Bogue Banks beaches is not adequately addressed in the EA. The 6.3 million cubic yards of material located at Brandt Island have not been tested for characteristics known to be of ecological importance (e.g., grain size/percent fines and carbonate/shell content ). The EA assumes that this material is representative of the material historically found in the navigation channels and concludes that no further analysis is warranted. NOAA Fisheries is concerned that sediments removed from the navigation channels may contain significantly different percentages of shell, silt, and clay than those found Bogue Banks beaches. This is important since significant differences in sediment compositions could adversely affect the recovery of surf zone fish and invertebrate species. Based on (1) previous observations which revealed material previously pumped from Brandt Island to Fort Macon was darker and contained large amounts of shell; (2) previously stated concerns regarding the sediment compatibility at Bogue Banks; and (3) the absence of site specific sediment analysis for the Brandt Island material, we find no convincing basis for assertion, as contained in the EA, that the material is compatible and can be used without ecological or environmental impacts. Therefore, NOAA Fisheries recommends completion of a comprehensive evaluation of sediment size and composition prior to implementation of the proposed Section 933 project.

In view of the preceding, NOAA Fisheries recommends against construction of the project unless the following conditions are incorporated into the project plan.

### **EFH Conservation Recommendations**

1. The "without the project" conditions in the EA should be modified to include shoreline changes associated with the BBBNP. The BBBNP represents a significant change in the

“without the project” conditions and these changes should be considered in the overall analyses of the need and timing of the proposed action.

2. In order to avoid and minimize adverse impacts to surf zone EFH and associated fishery resources during peak periods of biological activity, project construction should be limited to the period between November 16 and March 1 of any year.
3. Prior to the placement of fill material on Bogue Banks, it should be evaluated and found to be compatible and suitable with regard to fishery habitat and other ecological and environmental factors.
4. To avoid and minimize cumulative adverse impacts, scheduling of the project should be revised so that any section of beach nourished in connection with the BBBNP after December 2001, should allow for a minimum three year recovery period for fish and macro-invertebrate populations.
5. Avoidance and minimization of adverse impacts is always preferable to restoration after impacts occur; however, since placement of incompatible sediments on the ocean beachfront and surf zone is a reoccurring concern, the COE should develop a beach nourishment reclamation plan to address this possibility. The plan could include measures such as removal of incompatible material and replacement with compatible material and/or an increase in monitoring the magnitude and longevity of ecological impacts.

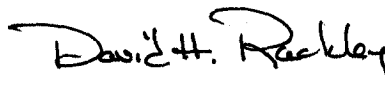
NOAA Fisheries is unable to concur with a Finding of No Significant Impact for this project and preparation of an Environmental Impact Statement (EIS) is recommended. An adequate EIS would provide for a comprehensive assessment of the site specific and cumulative impacts of Bogue Banks Section 933 project and other related activities and projects on Bogue Banks. Furthermore, the potential for significant and adverse long-term impacts to nationally important living marine resources is such that NOAA Fisheries may elect to recommend that the project not be implemented and, depending on the content and conclusions reached in the Final EA or EIS, refer this project to the Council on Environmental Quality under Section 1504 of the Council's Regulations for implementing the Procedural Provisions of the National Environmental Policy Act.

Section 305(b)(4)(B) of the MSFCMA and NOAA Fisheries' implementing regulation at 50 CFR Section 600.920(k) require your office to provide a written response to this letter within 30 days of its receipt. If it is not possible to provide a substantive response within 30 days, then in accordance with our “findings” with your Regulatory Functions Branch, an interim response should be provided to NOAA Fisheries. A detailed response then must be provided prior to final approval of the action. Your detailed response must include a description of measures proposed by your agency to avoid, mitigate, or offset the adverse impacts of the activity. If your response is inconsistent with our EFH Conservation Recommendations, you must provide a substantive discussion justifying the reasons for not following the recommendations.

Finally, these comments do not satisfy your consultation responsibilities under Section 7 of the Endangered Species Act of 1973, as amended. If any activity(ies) "may effect" listed species and habitats under the purview of NOAA Fisheries, consultation should be initiated with our Protected Resources Division at the letterhead address.

Thank you for the opportunity to provide these comments. Related questions or comments should be directed to the attention of Mr. Ronald S. Sechler at our Beaufort Office, 101 Pivers Island Road, Beaufort, North Carolina, or at (252) 728-5090.

Sincerely,



Frederick C. Sutter III  
Deputy Regional Administrator

cc:

USFWS Raleigh, NC

USEPA Athens, GA

NCWRC, Raleigh NC

NCDMF, Morehead City NC

SAFMC, Charleston NC



# United States Department of the Interior

## FISH AND WILDLIFE SERVICE

Raleigh Field Office  
Post Office Box 33726  
Raleigh, North Carolina 27636-3726

June 6, 2003

W. Coleman Long, Chief  
Planning and Environmental Branch  
Wilmington District  
U.S. Army Corps of Engineers  
Post Office Box 1890  
Wilmington, North Carolina 28402-1890

Dear Mr. Long:

This letter acknowledges the U.S. Fish and Wildlife Service's (Service) May 5, 2003 receipt of your May 3, 2003 letter requesting initiation of formal section 7 consultation under the Endangered Species Act of 1973, as amended (16 U.S.C. § 1531 et seq.). The consultation concerns the possible effects of your proposed Morehead City Harbor Section 933 Project on Federally-listed species, including the roseate tern (*Sterna dougallii*), piping plover (*Charadrius melodus*), West Indian manatee (*Trichechus manatus*), seabeach amaranth (*Amaranthus pumilus*), and green (*Chelonia mydas*), hawksbill (*Eretmochelys imbricata*), Kemp's ridley (*Lepidochelys kempii*), leatherback (*Dermochelys coriacea*), and loggerhead (*Caretta caretta*) sea turtles. All information required of you to initiate consultation was either included with your letter or is otherwise accessible for our consideration and reference.

The proposed action, as detailed in your draft Environmental Assessment and Evaluation Report, dated May 2003, consists of placing approximately 6.3 million cubic yards of dredged material stored in the Brandt Island disposal site and sediments from maintenance dredging of the inner and outer harbor navigation channels of Morehead City and Beaufort Inlet along approximately 13.2 miles of oceanfront beaches of Bogue Banks (including Fort Macon, Atlantic Beach, Pine Knoll Shores, Salter Path, and Indian Beach), Carteret County, North Carolina (hereafter referred to as Morehead City Harbor Section 933 Project). The proposed project is a one-time action scheduled to begin November 16, 2003 and continue for up to 16 months (estimated completion date April 30, 2005). However, the pump-out of Brandt Island and disposal of these sediments on the oceanfront beaches of Bogue Banks is expected to occur, as it has in the past, every 8 to 10 years.

The Service prepared a biological opinion, dated December 7, 1989, for the proposed dredging of Morehead City Harbor and subsequent disposal of dredged sediments in a Morehead City Ocean Dredged Material Disposal Site, an upland diked dredge disposal area on Brandt Island, or

pumped directly onto the oceanfront beach at Atlantic Beach. In our biological opinion we concurred with your findings that the proposed action would have no effect on the piping plover, roseate tern, and hawksbill and Kemp's ridley sea turtles, and that the proposed action may affect loggerhead and green sea turtles. Our biological opinion concluded that the proposed action was not likely to jeopardize the continued existence of loggerhead and green sea turtles.

An amendment to the biological opinion, dated April 19, 1993, was prepared in response to updated project plans of the original dredge and disposal action. The project modifications included the disposal of additional dredged sediment material on oceanfront beaches from Fort Macon State Park to Pine Knoll Shores and a different pipeline route than reviewed in the original project. The amended biological opinion concluded that the proposed project modifications were not likely to jeopardize the continued existence of loggerhead and green sea turtles. The amended biological opinion also included a conference opinion for the proposed Federally-threatened seabeach amaranth in which we concluded that the proposed action would not likely jeopardize the continued existence of this species.

In your Biological Assessment, dated May 2003, you determined that the updated project plans for the proposed Morehead City Harbor Section 933 Project are not likely to adversely affect the roseate tern or the West Indian manatee. Moreover, you determined that the proposed activities may affect the piping plover, seabeach amaranth, and green, hawksbill, Kemp's ridley, leatherback, and loggerhead sea turtles. We concur with your determination that the proposed action may affect the hawksbill, Kemp's ridley, and leatherback sea turtles; however, we conclude that the proposed action is not likely to adversely affect these species. In addition, based on the information provided and other information available, we concur with your determination that the proposed action is not likely to adversely affect the roseate tern. With regard to the West Indian manatee, however, the Service would concur with your determination that the proposed action is not likely to adversely affect this species if the measures detailed in the *Precautionary Measures For Activities In North Carolina Waters Which May Be Used By The West Indian Manatee* (attached) are implemented.

Because the proposed action is different in timing and scope from the project reviewed in the original biological opinion and amendment, and new information is available on the piping plover, seabeach amaranth, and green and loggerhead sea turtles, we are initiating formal consultation for these species. Section 7 allows the Service up to 90 calendar days to conclude formal consultation with your agency and an additional 45 calendar days to prepare our biological opinion (unless we mutually agree to an extension). However, we expect to provide you our second amendment to the biological opinion by late-July. Based on the information provided and other information available, we anticipate the second amendment to conclude that the proposed action is not likely to jeopardize the continued existence of the piping plover, seabeach amaranth, and green and loggerhead sea turtles. The second amendment will primarily update the incidental take statement and the reasonable and prudent measures with their implementing terms and conditions based on information obtained since the last project review and first amendment to the biological opinion.

We have assigned log number 03-S243 to this consultation. Please refer to that number in future correspondence on this consultation. If you have any questions or concerns about this consultation or the consultation process in general, please feel free to contact me or Mr. David Rabon of my staff at (919) 856-4520 extensions 11 or 16, respectively.

Sincerely,

A handwritten signature in cursive script, appearing to read "Garland B. Pardue".

Dr. Garland B. Pardue  
Ecological Services Supervisor

Encl.



## United States Department of the Interior

### FISH AND WILDLIFE SERVICE

Raleigh Field Office  
Post Office Box 33726  
Raleigh, North Carolina 27636-3726

#### **PRECAUTIONARY MEASURES FOR ACTIVITIES IN NORTH CAROLINA WATERS WHICH MAY BE USED BY THE WEST INDIAN MANATEE**

The West Indian manatee (*Trichechus manatus*), also known as the Florida manatee, is a Federally-listed endangered aquatic mammal protected under the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) and the Marine Mammal Protection Act of 1972, as amended (16 U.S.C 1461 *et seq.*). The manatee is also listed as endangered under the North Carolina Endangered Species Act of 1987 (Article 25 of Chapter 113 of the General Statutes). The U.S. Fish and Wildlife Service (Service) is the lead Federal agency responsible for the protection and recovery of the West Indian manatee under the provisions of the Endangered Species Act.

Adult manatees average 10 feet long and weigh about 2,200 pounds, although some individuals have been recorded at lengths greater than 13 feet and weighing as much as 3,500 pounds. Manatees are commonly found in fresh, brackish, or marine water habitats, including shallow coastal bays, lagoons, estuaries, and inland rivers of varying salinity extremes. Manatees spend much of their time underwater or partly submerged, making them difficult to detect even in shallow water. While the manatee's principal stronghold in the United States is Florida, the species is considered a seasonal inhabitant of North Carolina with most occurrences reported from June through October.

To protect manatees in North Carolina, the Service's Raleigh Field Office has prepared precautionary measures for general construction activities in waters used by the species. Implementation of these measure will allow in-water projects which do not require blasting to proceed without adverse impacts to manatees. In addition, inclusion of these guidelines as conservation measures in a Biological Assessment or Biological Evaluation, or as part of the determination of impacts on the manatee in an environmental document prepared pursuant to the National Environmental Policy Act, will expedite the Service's review of the document for the fulfillment of requirements under Section 7 of the Endangered Species Act. These measures include:

1. The project manager and/or contractor will inform all personnel associated with the project that manatees may be present in the project area, and the need to avoid any harm to these endangered mammals. The project manager will ensure that all construction personnel know the general appearance of the species and their habit of moving about completely or partially submerged in shallow water. All construction personnel will be informed that they are responsible for observing water-related activities for the presence of manatees.
2. The project manager and/or the contractor will advise all construction personnel that

there are civil and criminal penalties for harming, harassing, or killing manatees which are protected under the Marine Mammal Protection Act and the Endangered Species Act.

3. If a manatee is seen within 100 yards of the active construction and/or dredging operation or vessel movement, all appropriate precautions will be implemented to ensure protection of the manatee. These precautions will include the immediate shutdown of moving equipment if a manatee comes within 50 feet of the operational area of the equipment. Activities will not resume until the manatee has departed the project area on its own volition (i.e., it may not be herded or harassed from the area).

4. Any collision with and/or injury to a manatee will be reported immediately. The report must be made to the U.S. Fish and Wildlife Service (ph. 919.856.4520 ext. 16), the National Marine Fisheries Service (ph. 252.728.8762), and the North Carolina Wildlife Resources Commission (ph. 252.448.1546).

5. A sign will be posted in all vessels associated with the project where it is clearly visible to the vessel operator. The sign should state:

**CAUTION:** The endangered manatee may occur in these waters during the warmer months, primarily from June through October. Idle speed is required if operating this vessel in shallow water during these months. All equipment must be shut down if a manatee comes within 50 feet of the vessel or operating equipment. A collision with and/or injury to the manatee must be reported immediately to the U.S. Fish and Wildlife Service (919-856-4520 ext. 16), the National Marine Fisheries Service (252.728.8762), and the North Carolina Wildlife Resources Commission (252.448.1546).

6. The contractor will maintain a log detailing sightings, collisions, and/or injuries to manatees during project activities. Upon completion of the action, the project manager will prepare a report which summarizes all information on manatees encountered and submit the report to the Service's Raleigh Field Office.

7. All vessels associated with the construction project will operate at "no wake/idle" speeds at all times while in water where the draft of the vessel provides less than a four foot clearance from the bottom. All vessels will follow routes of deep water whenever possible.

8. If siltation barriers must be placed in shallow water, these barriers will be: (a) made of material in which manatees cannot become entangled; (b) secured in a manner that they cannot break free and entangle manatees; and, (c) regularly monitored to ensure that manatees have not become entangled. Barriers will be placed in a manner to allow manatees entry to or exit from essential habitat.

Prepared by (rev. 06/2003):  
U.S. Fish and Wildlife Service  
Raleigh Field Office  
Post Office Box 33726  
Raleigh, North Carolina 27636-3726  
919/856-4520



Figure 1. The whole body of the West Indian manatee may be visible in clear water; but in the dark and muddy waters of coastal North Carolina, one normally sees only a small part of the head when the manatee raises its nose to breathe.

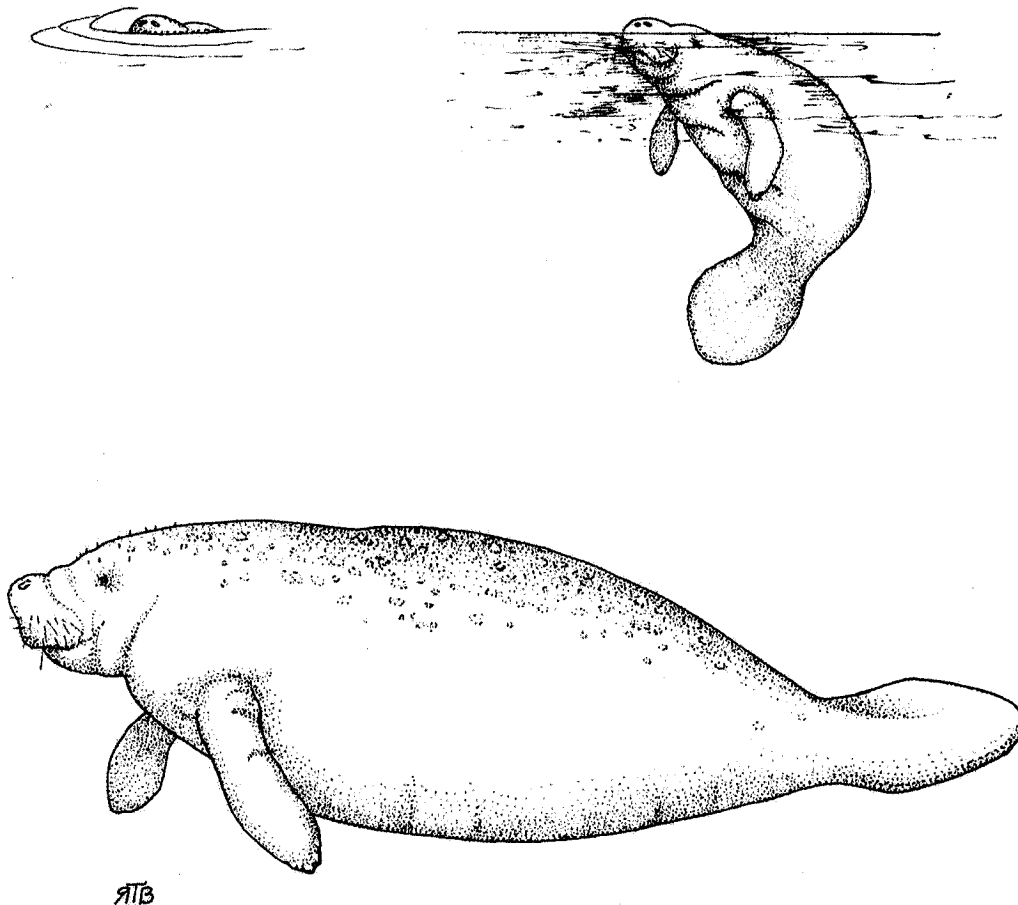


Illustration used with the permission of the North Carolina State Museum of Natural Sciences.  
Source: Clark, M. K. 1987. Endangered, Threatened, and Rare Fauna of North Carolina: Part I.  
A re-evaluation of the mammals. Occasional Papers of the North Carolina Biological Survey 1987-  
3. North Carolina State Museum of Natural Sciences. Raleigh, NC. pp. 52.



# United States Department of the Interior

## FISH AND WILDLIFE SERVICE

Raleigh Field Office  
Post Office Box 33726  
Raleigh, North Carolina 27636-3726

19 June 03 (GTB)

TS

2, DX, PM

June 6, 2003

Colonel Charles R. Alexander  
District Engineer, Wilmington District  
U.S. Army Corps of Engineers  
Post Office Box 1890  
Wilmington, North Carolina 28402-1890

Dear Colonel Alexander:

The U.S. Fish and Wildlife Service (Service) has received the draft Environmental Assessment (EA) and Evaluation Report for the Section 933 project proposed for Bogue Banks in Carteret County, North Carolina. The U.S. Army Corps of Engineers (Corps) proposes to place material stored in the Brandt island disposal site and dredged during maintenance of the inner and outer harbor navigation channels of Morehead City and Beaufort Inlet on the oceanfront beaches of Fort Macon, Atlantic Beach, Pine Knoll Shores and Indian Beach. The currently authorized dredge disposal area is along approximately 6 miles of beach in Fort Macon and Atlantic Beach, and the proposed Section 933 project would extend the disposal area an additional 7.2 miles in Pine Knoll Shores and Indian Beach (which includes Salter Path). Up to 6.3 million cubic yards (mcy) of material are anticipated for placement along a total of 70,000 feet (13.2 miles) of oceanfront beach on Bogue Banks. Construction is proposed from November 16, 2003, through April 30, 2005.

These comments are submitted pursuant to, and in accordance with, provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.) and the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.). This letter does not constitute the Service's report in accordance with Section 2(b) of the Fish and Wildlife Coordination Act (FWCA).

The Service issued a draft Fish and Wildlife Coordination Act (FWCA) report on the Federal shore protection project for Bogue Banks in November 2002 (available on our website at <http://nc-es.fws.gov/pubs/fwca/bogue.html>). This project is distinct from the Section 933 project and is a storm damage reduction project along the entire 26 mile length of Bogue Banks. In this report the Service summarized the fish and wildlife resources in the Bogue Banks area, which includes the project area for the proposed Section 933 project. The Service incorporates this report by reference, particularly its list of conservation measures for avoiding, minimizing and

mitigating potential adverse environmental impacts resulting from the placement of fill material via dredging equipment on oceanfront beaches.

The Service supports projects that (1) are ecologically sound; (2) are the least environmentally damaging alternative; (3) have avoided and minimized damage or loss of fish and wildlife resources and uses; (4) have adopted all important recommended conservation measures to compensate for unavoidable damage or loss to fish and wildlife resources; and (5) are clearly a water dependent activity with a demonstrated public need if there are wetland or shallow water habitats in the project area (January 23, 1981, Federal Register v. 46, n. 15, p. 7659).

The Service does not believe that this project, as currently proposed, gives equal consideration to fish and wildlife resources and may generate adverse impacts to aquatic resources of national importance. In addition, we do not think this project meets the 404(b)(1) guidelines for the Clean Water Act.

### **Environmental Acceptability**

The project documents do not adequately consider the locally constructed Bogue Banks Beach Restoration Project (BBBRP). The Evaluation Report and EA cite recent storm damages and erosion as the need for the project, and reduction in storm damages and erosional losses as the beneficial use of the dredged material. However, the Evaluation Report states that "the 'most likely future' scenario along the Section 933 project area is that erosion control measures by local and state interests are not expected to provide significant protection against the erosion and flooding associated with hurricane and storm events" (p. 19).

The Service strongly disagrees with this finding. The Section 933 project evaluation determined that a 30 foot wide addition to the beach would significantly reduce storm damages, for a total of \$8.95 million in annual benefits in Pine Knoll Shores and Indian Beach. The BBBRP had a design width of over 30 feet throughout these communities, however. To make a determination that the locally constructed beach wider than what the Corps has determined will significantly reduce storm damages and erosional losses (30 feet) as insignificant is not sound.

Secondly, the material to be pumped from Brandt Island (an estimated 4 mcy) has not been tested for sedimentary characteristics known to be ecologically significant to fish and wildlife resources (i.e., carbonate content, color, grain size). The Corps assumes that material presently within the navigational channels of the inner harbor are representative of the dredged materials currently residing in Brandt Island. The EA does not include the sedimentary analyses of this material (which the Service understands is presently underway) and makes the assumption that it is suitable for beach placement.

The Service does not concur with either of these assumptions. Material previously pumped from Brandt Island to Fort Macon contained dark gray and highly shelly material that created tall

scarps that are still sometimes visible at the park (Figure 1). This material is similar to the ecologically incompatible material used in the BBBRP. It is not reasonable to assume that all of the material presently within Brandt Island is ecologically compatible with the native beaches of Bogue Banks. The Service strongly recommends sampling the sediments currently within Brandt Island to determine the compatibility of this material for beach placement.

Moreover, sediments that settle within navigation channels may be significantly finer than beach sands and contain high percentages of silt and clay. The Evaluation Report and EA assume that only beach quality sand will be present in the deepwater channels of the inner harbor. That assumption is premature. Since geotechnical data are presently being compiled for the sediments in the inner harbor channels, the Service recommends that any evaluation of the suitability of the material for beach placement be delayed until the data are available.

The least environmentally damaging alternative would utilize sediments that are ecologically compatible with Bogue Banks beaches. A recent study by the Service determined that native sediments of North Carolina beaches contain less than 12.8 % gravel (sediments larger than 2 millimeters (mm)), less than 4.1 % fines (sediments smaller than 1/16 mm), and an average of 7.4 % carbonate or shelly material. Site specific data available for Bogue Banks indicate that the native sediments for the sandy beach ecosystem contain 4.9 % gravel, 0.6 % fines, and 13.3 % shell material. The limited data utilized to assess sediment compatibility for the Section 933 project indicate that the proportion of fines may be 6 % to 12 % (p. EA-15, EA-16). The absence of sedimentary data for the Brandt Island fill material preclude a determination that the material is similar to existing material and suitable for fish and wildlife resources. Previous experiences with ecologically incompatible sediments at both Fort Macon and the BBBRP project area do not support a reasonable assumption that the Section 933 project will only place beach compatible material on the beaches of Bogue Banks.

### **Ecological Impacts**

The local communities of Pine Knoll Shores, Indian Beach and Emerald Isle currently have a Regulatory Permit for the three phase Bogue Banks Beach Restoration Project along 16.8 miles of beach on Bogue Banks. Pine Knoll Shores and Indian Beach were constructed in 2001-02 (Phase I). Eastern Emerald Isle was constructed from January to March 2003 (Phase II). The third phase of this project is scheduled for western Emerald Isle during the winter of 2004-05. These oceanfront beaches were impacted by a dredge and fill project with dimensions similar to those proposed by the Section 933 project.

The available data indicate that the sandy beach ecosystem in the BBBRP area has not recovered, and the Section 933 project would eliminate any recovery gains made by the system in the last year. Furthermore, the Section 933 project would bury the closest recruitment population for macroinvertebrates at Atlantic Beach. The macroinvertebrate population, dominated by coquina clams (*Donax variabilis*) and mole crabs (*Emerita talpoida*), is the prey base for regionally and

nationally significant waterbirds, shorebirds, and fishery species. The Service believes that burial of the macroinvertebrate prey population twice within a three year period will generate significant ecological impacts, delaying the recovery of the food source for longer than would occur if the Section 933 project were constructed after the prey base within the BBBRP area was fully recovered.

Furthermore, the cumulative impacts of multiple dredge and fill projects on Bogue Banks within a short period of time will be significant. The Service does not concur with the Corps' finding that cumulative impacts will be insignificant. Phase I of the BBBRP was constructed from December 2001 through April 2002. Phase II of the BBBRP was constructed from January to March 2003. Maintenance dredge disposal of navigational channels in and around the Morehead City harbor placed 209,348 cubic yards of material at Fort Macon during early 2002. The Section 933 project proposed to place 6.3 mcy of material on Bogue Banks in 2003, 2004 and 2005. Phase III of the BBBRP is currently scheduled for the winter months of 2004 and 2005.

The cumulative impacts of five large scale dredge and fill projects on the same barrier island within less than 4 years will be significant. Less than one mile of oceanfront beach on the island would remain undisturbed by fill placement in western Emerald Isle near Bogue Inlet. That less than one mile area would be indirectly impacted by the proposed Bogue Inlet Relocation Project during the same time period (as Bogue Inlet is proposed for relocation and/or mining for Phase III of the BBBRP). Migratory populations of waterbirds, shorebirds and fishery resources are not likely to have reliable sources of food along virtually the entire 26 mile long barrier island for a number of years.

Although the islands to the east and southwest of Bogue Banks are in conservation, several studies indicate that migratory birds have high site fidelity to migratory staging, stopover and overwintering sites that are smaller in areal extent (e.g., 10 kilometers (6.2 miles)) than Bogue Banks is long (e.g., 41.8 km (26 mi)) (Dinsmore et al. (1998); Pfister et al. (1998); Johnson and Baldassarre (1988)). The Section 933 project documentation concludes that habitat disturbance from beach fill projects is not likely to have population level impacts on avifauna. Dinsmore et al. (1998, p. 171)), however, concluded that "habitat loss or alteration [on the Outer Banks of North Carolina] could adversely affect the Atlantic Flyway population of several [bird] species (e.g., Sanderlings) as well as the threatened Piping Plover." The draft EA does not adequately address the continuous perturbation of the Bogue Banks sandy beach ecosystem and the impacts it will have on migratory birds. Chronic disturbance of valuable foraging habitat may be more important than occasional disturbances and may affect shorebird survival rates (Pfister et al. (1992, 1998); West et al. (2002)). The Service disagrees with the Corps' finding that the proposed project will not significantly impact migratory bird populations and recommends that an Environmental Impact Statement be prepared to fully evaluate this concern.

As currently proposed, the Section 933 project anticipates a year-round construction schedule that would start November 16, 2003 and proceed for up to 16 months through April 30, 2005. The Corps proposes a Finding of No Significant Impact (FONSI) for this construction schedule,

even though the generally accepted environmental window for dredge and fill projects in North Carolina occurs during the winter months from November 16 to the end of March or April annually. The Corps has determined that the year-round construction schedule and the use of hopper dredges may adversely impact federally-protected species such as sea turtles, piping plover (*Charadrius melodus*) and seabeach amaranth (*Amaranthus pumilus*). The Service contends that a FONSI is inconsistent with any shoreline stabilization or dredge disposal project (on beaches) scheduled for the summer months, which are the peak biological productivity period for coastal North Carolina.

#### **404(b)(1) Guidelines**

Environmental impacts should first be avoided, then minimized. Any unavoidable environmental impacts should then be compensated with mitigation. The draft EA has determined that the proposed Section 933 project has avoided and minimized environmental impacts. The Service does not concur with this finding.

If the project proceeds, the Service has identified the following conservation measures to avoid and minimize environmental impacts from a Section 933 project at Pine Knoll Shores and Indian Beach:

- 1) Avoid periods of peak biological activity, limiting construction to the environmentally acceptable window of November 16 to March 1 annually.
- 2) Use fill material that has been adequately evaluated and is ecologically compatible with the native beach material on Bogue Banks.
- 3) Update the without project condition and existing conditions of the project area to include the locally constructed Bogue Banks Beach Restoration Project.
- 4) Avoid pumping out Brandt Island during colonial waterbird and shorebird nesting seasons, when these species are likely to be nesting on Brandt Island.
- 5) Avoid destruction of habitat for the as yet unidentified skipper (*Atrytonopsis* new species 1) Brandt Island, which may be endemic to the greater project area, until ecological studies of the species are completed.
- 6) Avoid complete elimination of nesting waterbird and shorebird habitat on Brandt Island by configuring the remaining dikes and spoil material to include a bare sand island less than 15 feet in elevation and separated from vegetated areas by a minimum of 100 yards of deep water.

The Service has also identified several potential measures for compensatory mitigation for

unavoidable ecological impacts:

- 1) Maintain a semi-permanent bare ground nesting island within the Brandt Island complex for shorebird and waterbird nesting, separated from vegetated areas by at least 100 yards of deep water to minimize predation of nests.
- 2) Enhance shorebird and waterbird nesting and foraging habitat in the area by working with the local sponsors to implement leash laws, bird nesting areas (denoted by signage and post and rope fencing), prohibiting beach driving in certain areas, and banning kites and fireworks. West Point near Bogue Inlet is a potential location for such mitigation.
- 3) Implement year-round bird monitoring in the project area to determine the longevity of ecological impacts to nesting and foraging waterbirds and shorebirds.
- 4) Implement a survey and monitoring program for the unnamed skipper to aid in the identification, description and conservation of this potentially new species.
- 5) Enhance the recovery of macroinvertebrate species in the fill placement areas by harvesting and transplanting dominant species or stocking the new fill material with cultured populations.
- 6) Design a remediation plan for inadvertent placement of incompatible fill materials on the beach. Remediation measures may include removal of incompatible material, replacement with compatible material, and increased scientific monitoring of the magnitude and longevity of ecological impacts.

The Service believes that incorporation of these conservation measures to avoid, minimize and mitigate for ecological impacts would satisfy the 404(b)(1) guidelines. At present the draft EA does not include conservation measures to sufficiently avoid and minimize impacts.

In conclusion, the Service does not believe that the proposed Section 933 project for Bogue Banks, as presently designed, gives equal consideration to fish and wildlife resources. The project as proposed does not meet the criteria of the Service's Mitigation Policy. A Finding of No Significant Impact is not warranted and the Service requests an Environmental Impact Statement be prepared. The ecological impacts of the project are likely to be significant, particularly if the current perturbations to the Bogue Banks sandy beach ecosystem and the migratory populations that it supports are continued. In accordance with the procedural requirements of the 1992 404(q) Memorandum of Agreement, Part IV.3(a), we are advising you that the proposed work may result in substantial and unacceptable impacts to aquatic resources of national importance.

We appreciate the opportunity to provide comments on the draft Evaluation Report and

Environmental Assessment. Please contact Tracy Rice of my staff at (919) 856-4520 extension 12 with any questions or comments.

Sincerely,



Garland B. Pardue, Ph.D.  
Ecological Services Supervisor

#### References

- Dinsmore, S.J., J.A. Collazo, and J.R. Walters. 1998. Seasonal numbers and distribution of shorebirds on North Carolina's Outer Banks. *Wilson Bull.*, 110(2): 171-181.
- Johnson, C.M., and G.A. Baldassarre. 1988. Aspects of the wintering ecology of piping plovers in coastal Alabama. *Wilson Bull.*, 100: 214-223.
- Pfister, C., B.A. Harrington, and M. Lavine. 1992. The impact of human disturbance on shorebirds at a migration staging area. *Biological Conservation* 60: 115-126.
- Pfister, C., M.J. Kasprzyk, and B.A. Harrington. 1998. Body fat levels and annual return in migrating Semipalmated Sandpipers. *Auk* 115: 904-915.
- West, A.D., J.D. Goss-Custard, R.A. Stillman, R.W.G. Caldow, S.E.A. le V. Dit Durell, and S. McGrorty. 2002. Predicting the impacts of disturbance on shorebird mortality using a behaviour-based model. *Biological Conservation* 106: 219-328.

cc: NC WRC, Washington, NC (David McHenry)  
NC WRC, Trenton, NC (David Allen)  
NC WRC, Beaufort, NC (Matt Godfrey)  
NC DMF, Morehead City, NC (Mike Street)  
NC DCM, Raleigh, NC (Donna Moffitt)  
NMFS, Beaufort, NC (Ron Sechler)  
EPA, Atlanta, GA (Gerald Miller)  
North Carolina Coastal Federation, Newport, NC (Todd Miller)



**Figure 1.** A previous placement of dredged material at Fort Macon contained ecologically incompatible material that was dark gray and shelly. This material still forms resistant scarps over 5 feet tall at Fort Macon State Park. Note the 15 centimeter scale propped on the vertical scarp. A dredge pipe from the 2002 fill placement at Fort Macon is visible at the base of the scarp. Photo taken March 2002.





## North Carolina Department of Administration

Michael F. Easley, Governor

Gwynn T. Swinson, Secretary

June 9, 2003

Mr. Hugh Heine  
Dept. of the Army/Corps of Engineers  
Environmental Resources Section  
PO Box 1890  
Wilmington, NC 28402-1890

Dear Mr. Heine:

Re: SCH File # 03-E-0000-0315; Environmental Assessment; Morehead City Harbor Section 933;  
Placement of dredged same beach quality sand on about 13 miles of Bogue Bank beaches to  
reduce potential of erosion and storm damage.

The above referenced environmental impact information has been submitted to the State Clearinghouse under the provisions of the National Environmental Policy Act. According to G.S. 113A-10, when a state agency is required to prepare an environmental document under the provisions of federal law, the environmental document meets the provisions of the State Environmental Policy Act. Attached to this letter for your consideration are the comments made by agencies/organizations to this office in the course of this review.

If any further environmental review documents are prepared for this project, they should be forwarded to this office for intergovernmental review.

Should you have any questions, please do not hesitate to call.

Sincerely,

A handwritten signature in black ink that reads "Chrys Baggett".

Ms. Chrys Baggett  
Environmental Policy Act Coordinator

Attachments

cc: Region P

Mailing Address:  
1302 Mail Service Center  
Raleigh, NC 27699-1302

Telephone: (919)807-2425  
Fax (919)733-9571  
State Courier #51-01-00  
e-mail Chrys.Baggett@ncmail.net

Location Address:  
116 West Jones Street  
Raleigh, North Carolina



North Carolina Department of Environment and Natural Resources

Michael F. Easley, Governor

William G. Ross Jr., Secretary

MEMORANDUM

TO: Chrys Baggett  
State Clearinghouse

FROM: Melba McGee *mm*  
Environmental Review Coordinator

RE: 03-0315 DEA for Morehead City Harbor Section 933, Bogue Banks,  
Carteret County

DATE: June 6, 2003

The Department of Environment and Natural Resources has completed its review of the proposed draft evaluation report. The purpose of this report is to investigate the placement of dredged maintenance material along a portion of Bogue Banks beaches.

The primary concern with the beach disposal is the potential for indirect impacts to mole crabs, coquina clams, sea turtles and shore birds due to potential reductions on food resources. The department is equally concerned with the effects of year round disposal on fish and birds, the quality of the disposal material, its effect on sand temperature, meeting recommended moratorium deadlines and monitoring. The department does not believe the Environmental Assessment provided a thorough discussion of these points and believes division's concerns should be thoroughly addressed prior to this project moving forward. It is our recommendation that the Corps of Engineers would benefit more by preparing an Environmental Impact Statement. The Environmental Impact Statement would give a more accurate picture of the direct impacts and evaluate whether the dredge disposal would have insignificant impacts on the beach ecosystem.

1601 Mail Service Center, Raleigh, North Carolina 27699-1601  
Phone: 919-733-4984 \ FAX: 919-715-3060 \ Internet: [www.enr.state.nc.us/ENR](http://www.enr.state.nc.us/ENR)

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Thank you for the opportunity to respond. The Corps is encouraged to notify our reviewing divisions with any problems or questions they may have in resolving their concerns. Final approval will depend on the impacts of this project being adequately addressed.

Attachments



North Carolina Department of Environment and Natural Resources  
Division of Marine Fisheries

Michael F. Easley, Governor  
William G. Ross, Jr., Secretary

Preston P. Pate, Jr., Director

**MEMORANDUM**

TO: Melba McGee  
Environmental Coordinator  
Office of Legislative & Intergovernmental Affairs

FROM: Preston P. Pate, Jr., Director  
Division of Marine Fisheries

DATE: May 27, 2003

SUBJ: Morehead City Harbor Section 933 EA  
Carteret County

I have reviewed the comments provided by the District Manager and/or Bio-Supervisor and concur with their recommendation(s).

*Preston P. Pate, Jr.* 5/23/03  
Director, Date  
Preston P. Pate, Jr.

\_\_\_\_\_  
Deputy Director, Date  
Michael G. Buhl

\_\_\_\_\_  
Habitat Protection Section Date  
Section Chief,  
Michael W. Street

3441 Arendell St., P.O. Box 769 Morehead City, North Carolina 28557  
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**Subject: Morehead City Harbor/Bogue Banks 933 project**

**Date: Fri, 06 Jun 2003 09:10:57 -0400**

**From: Mike Street <mike.street@ncmail.net>**

**To: Melba McGee <Melba.McGee@ncmail.net>**

**CC: Mike Marshall <Mike.Marshall@ncmail.net>**

Melba -- Mike Marshall and I have discussed the subject project. We agree that there are several issues of sufficient importance that they cannot be adequately addressed in a revised Environmental Assessment. Of special concern are cumulative impacts of this proposed one-time project and all the other proposed (reasonably foreseeable) and ongoing beach nourishment projects along Bogue Banks, including work in both Beaufort and Bogue inlets. It is simply unrealistic scientifically to continue to examine these many projects independently when the effects of these projects are not independent. Therefore, the Division of Marine Fisheries urges that an Environmental Impact Statement be prepared for the subject project.

Street

---

Michael W. Street <Mike.Street@ncmail.net>

State of North Carolina  
Department of Environment  
and Natural Resources  
Division of Marine Fisheries

Michael F. Easley, Governor  
William G. Ross, Jr., Secretary  
Preston P. Pate, Jr., Director



May 19, 2003

**MEMORANDUM**

TO: Melba McGee  
THROUGH: Mike Street  
FROM: Mike Marshall *[Signature]*  
SUBJECT: Morehead City Harbor Section 933 EA

The NC Division of Marine Fisheries (DMF) has reviewed the subject environmental assessment (EA) under authority of G. S. 113-131 and according to the Policies of the North Carolina Marine Fisheries Commission for Beach Dredge and Fill Projects, and we offer the following comments.

The subject EA discusses the impacts of lengthening the authorized beach disposal area for the Morehead City Harbor navigation project from 7 miles to 13 miles. The increased area will include western Pine Knoll Shores and Indian Beach along with the authorized areas of Fort Macon, Atlantic Beach and eastern Pine Knoll Shores.

Continuous pipeline construction is proposed beginning November 16, 2003 and construction is possible after May 1, 2004 in western Pine Knoll Shores and Indian Beach. Construction on a year round basis will result in impacts to local recreational and commercial fishing activities. Public trust uses of the surf zone and intertidal beach will also be affected during intensive use periods if construction extends into the summer months. These impacts should be examined in the EA.

The EA does not address the effects of year round pumping on beach prey species. The anticipated rate of 200 feet per day could have significant impacts on populations of mole crabs and coquina clams if allowed during the months when these species inhabit the intertidal beach. These impacts need to be discussed.

The EA rejects our earlier recommendation to monitor the impacts of the project and to coordinate that monitoring with the Bogue Banks monitoring plan. This course of action presents several problems that will affect our comments on further requests for large scale beach nourishment utilizing offshore borrow sites. The Morehead City Harbor Dredging and 933 beach disposal will progressively alter by pumping spoil onto sampling stations designed to evaluate the impacts of the Bogue Banks project. By May 1, 2004, at least three control stations and three monitoring stations will have been altered and two years of monitoring data will not be collected or will be compromised for those sites. Those six sites are 40% of the sites to be sampled and 50% of the control sites. Monitoring of the Bogue Banks project has taken on higher significance due to the high shell content of much of the nourishment material. This material may require extended

time for the beach to recover from making extended sampling critical. The impacts of the current project on this sampling should be addressed in the EA.

The possibility that a prolonged recovery period may be necessary for the Bogue Banks project indicates that further recovery time may be created by the additional nourishment in Pine Knoll Shores and Indian Beach. However, the initial recovery period may be reduced if the additional material is of better quality. Both of these possibilities should be examined in the EA.

Thank you for the opportunity to review and comment on the EA.  
**DMF finds the EA inadequate unless it is amended as indicated.**





North Carolina Department of Environment and Natural Resources  
Division of Coastal Management

Michael F. Easley, Governor

Donna D. Moffitt, Director

William G. Ross Jr., Secretary

**MEMORANDUM**

**RECEIVED**

JUN 10 2003

**TO:** Guy Pearce, Consistency Coordinator

**FROM:** M. Ted Tyndall, Morehead City District Manager

**DIV. OF COASTAL MANAGEMENT  
RALEIGH**

**SUBJECT:** DCM03-06; Draft Environmental Assessment - Morehead City Harbor  
- Section 933, Carteret County

**DATE:** June 6, 2003

The project is located on Bogue Banks in the communities of Atlantic Beach, Pine Knoll Shores, and Indian Beach (which includes Salter Path) and includes Fort Macon State Park. This office offers the following comments and recommendation on the subject project.

Brandt Island was previously pumped out back in 1986 and 1994. The material was placed onto the beaches of Atlantic Beach and Fort Macon. These projects were found consistent with the Coastal Management Program in late 1985 and amended in March of 1986. Then in early 1993, the DCM made a determination that the "base disposal area" covering some 6 miles of Atlantic Beach and Fort Macon remained consistent with the Coastal Management Program. Similarly, the area to be nourished under the authority of Section 933 includes over 7 miles of Pine Knoll Shores, Indian Beach and Salter Path. This is the same area that was authorized for beach nourishment under CAMA Major Permit #124-01 and most of which was completed.

Based on our review, this office would offer the following comments regarding the Draft Evaluation and Environmental Assessment.

- 1) On page EA-3, there is a statement that "beach-quality dredged material" must not have more than 10 percent fine sediment. This statement read in conjunction with the preceding statement on that page about the Coastal Management Program requiring beach-quality sand dredged from navigation channels not being permanently removed from the system is somewhat misleading. Currently, the Division of Coastal Management does not have any rules that reference a specific sand/silt percentage for beach deposition.

Pearce memo

re: Section 933

Page 2

June 6, 2003

- 2) The document states that the towns of Atlantic Beach and Pine Knoll Shores will be responsible for surveying the first line of stable natural vegetation along the beach strand within their jurisdiction. By CRC rule, this line is the vegetation line that existed before commencement of the 1986 and 1994 projects. The division requests copies of these maps, preferably done as overlays on ortho aerial photographs.
- 3) The Division of Coastal Management would echo sentiments made by Jody Merritt, the Park Superintendent, in his February 2, 2002 letter regarding the importance of sand being placed on the recreation beach at the Fort. The Division of Coastal Management concurs that the beach access point near the western end of the Park should be a high priority for sand deposition. The sand pumped in front of the Fort back in 2002 stopped short of this area leaving a very narrow useable beach at high tide.
- 4) The office would also request that if a consistency statement is issued that all commitments made in the EA, including those listed on page EA-52, be listed as conditions of that consistency.

Based on our review, it appears that the proposal is consistent with the North Carolina Coastal Management Program.

cc: Charles Jones - Assistant Director, DCM  
Brad Shaver - Field Representative, DCM  
Tracey Wheeler - Field Representative, DCM



## North Carolina Wildlife Resources Commission

Charles R. Fullwood, Executive Director

### MEMORANDUM

**TO:** Melba McGee, Environmental Coordinator  
Office of Legislative and Intergovernmental Affairs  
North Carolina Department of Environment and Natural Resources  
and  
Guy Pearce, Consistency Coordinator  
Division of Coastal Management  
North Carolina Department of Environment and Natural Resources

**FROM:** Shannon Deaton, Section Manager *Shannon Deaton*  
Habitat Conservation Section

**DATE:** May 27, 2003

**SUBJECT:** Comments on Draft Evaluation Report and Environmental Assessment for Morehead City Harbor Section 933, Bogue Banks, Carteret County, North Carolina.  
OLIA project # 03-0315  
DCM03-06

Biologists with the North Carolina Wildlife Resources Commission (Commission) reviewed the Environmental Assessment (EA) with regard to impacts of the project on fish and wildlife resources. Our comments are provided in accordance with provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.) and the North Carolina Environmental Policy Act (G.S. 113A-1 et seq., as amended; 1 NCAC-25).

The United States Army Corps of Engineers (Corps) is proposing disposal of dredge material on Bogue Banks to replenish the eroding beaches and reduce the potential for storm damage. The Corps currently disposes of dredged material from the Brandt Island disposal site and Morehead City Harbor navigation channels along a 32,000' base disposal area extending from Fort Macon to Atlantic Beach. Under provisions of Section 933 of the Water Resources Development Act, the Corps, with cost-sharing support from Carteret County, is proposing extending the disposal area by 38,000' on beach along the towns of Pine Knoll Shores, Indian Beach, and Salter Path. If the Section 933 project is implemented, the existing base disposal area will receive 1.8 million cubic yards of material with a design berm width reduced from 150' to 30'. The Section 933 project area would receive approximately 4.5 million cubic yards of material to construct a design berm with a width of 30 feet and elevation of 7 feet. Project construction with pipeline and hopper dredges may begin November 16, 2003 and continue uninterrupted for up to 16 months. Hopper dredging would only be used in the Morehead City outer harbor from January 1 to March 31 of any year to minimize the potential take of sea turtles.

The proposed Section 933 project is inconsistent with our *Policies and Guidelines for Conservation of Wetlands and Aquatic Habitats*. The Commission recognizes that beach renourishment is sometimes necessary to counteract erosion that threatens developed coastal areas. However, renourishment should be conducted in a manner that minimizes direct, adverse impacts on wildlife resources and their habitat. Avoidance of critical nesting or foraging periods is often used to minimize impacts on wildlife resources. Beach or dune construction activities during these critical periods should only be conducted when human health and safety are in eminent danger. Beach renourishment conducted from 2001 to 2002 along the Section 933 project area has largely precluded the urgency to conduct additional beach disposal during recommended moratoriums. The Commission has the following additional comments and concerns regarding impacts of the proposed project on fish and wildlife resources and recommended mitigation strategies for those impacts:

#### Sea Turtle and Shorebird Impacts

- The Commission disagrees with the inference that beaches on Bogue Banks are suitable for only loggerhead (*Caretta caretta*) turtles. In fact, during the 2000 nesting season, there was a confirmed green (*Chelonia mydas*) turtle nest on Bogue Banks and habitat there is also suitable for leatherback (*Dermochelys coriacea*) turtles. Given that nesting by both leatherbacks and green turtles has sharply increased in the last 10 years in the Southeastern United States, and North Carolina represents the northern limit of nesting for both of these species, increased nesting in the state in the near future would not be unexpected. Therefore, Bogue Banks must be considered suitable nesting habitat for loggerheads, as well as greens and leatherbacks.
- Restricting hopper dredging between January and March is appropriate because water temperatures are cool and sea turtle abundance is likely to be lowest. However, as experienced with other similar projects, anticipated schedules are sometimes delayed, which places sea turtles at substantial risk. Therefore, the Commission feels that contingency sea turtle protection plans need to be prepared including anticipatory trawling to remove any turtles in the project area.
- In addition to in-water measures, if renourishment occurs during the sea turtle nesting season, sufficient time must be provided on a daily basis to allow volunteers/monitors to locate at-risk nests for subsequent relocation. The Commission recommends a no-work window until 10 am each day during the nesting season to ensure sufficient time to get any nests off the beach, and also to locate any turtles that nest late into the night and do not return to the ocean until around sunrise. Effective communication between the monitors and the dredge workers is essential to these mitigation efforts.
- The Commission is encouraged by the prospect that the material proposed for placement on the beaches might be more suitable material than that placed by previous renourishment work on Bogue Banks. However, recent work also resulted in the placement of incompatible materials on the beach despite extensive pre-project sediment quality testing of the source areas. Therefore, the Commission feels that, in addition to thorough testing of the dredge and pumpout areas, a inviolate protocol for monitoring, communicating, and responding to any unforeseen placements of incompatible material on the beach should be implemented for any Section 933 project on Bogue Banks.
- Several factors would counteract the perceived benefit of additional disposal of more compatible material so soon after the previous renourishment project. The EA states that "migratory shorebirds may use the project area for foraging and roosting habitat, but would not be adversely affected by the proposed action." While the beachfront of Bogue Banks does not support much nesting habitat because of the extensive development, some nesting by Wilson's plovers (*Charadrius wilsonia*), willets (*Catoptrophorus semipalmatus*) and American oystercatchers (*Haematopus palliatus*) may still occur on wider beach stretches and migratory shorebirds such as sanderlings (*Calidris alba*) and ruddy turnstones (*Arenaria interpres*) do forage and roost in the project area. Any depletion of the prey base could certainly have a negative affect on these latter bird species. The pumping of sand onto the beach covers and depletes invertebrate resources and successive burial, as would be the case for Indian Beach and Pine Knoll Shores, greatly delays recovery. Further, renourishment during the

months of March through May is particularly destructive since this is the primary recruitment period for most beach macroinvertebrates. The EA also mentions a recent year-round study of shorebird use in Brunswick County, North Carolina (USACE 2002). Although this report indicated that beach nourishment had "no measurable impact on bird use during the first year of monitoring," it was also concluded that "...the power for all statistical comparisons regarding the effects of renourishment was generally low, indicating that additional surveys or data will be required prior to confident conclusions."

- Since renourishment would deplete beach macroinvertebrate populations, particularly if conducted during the primary recruitment period, the Commission recommends implementation of a restocking program for coquina clams and/or mole crabs to accelerate recovery from any Section 933 project. This program could either involve collection at the project site before spoil placement or possibly the use of cultured sources of these invertebrates.
- In addition to impacts on macroinvertebrate resources and waterbirds, the new spoil material may adversely effect sea turtle nesting. For example, the disposal may alter the thermal environment during incubation, and hence alter the sex ratios of the hatchlings produced by eggs laid there in future years. Similarly, turtle nests moved from the work area may experience different temperatures in their relocated positions. If such measures are implemented, the Commission recommends that dataloggers be purchased to not only monitor sand temperatures both pre and post project, but also nest temperatures of relocated nests. The Commission has some dataloggers for Atlantic Beach to Bogue Inlet, but more (approximately 20) are needed to monitor sand temperatures of the beach in Fort Macon and also nest temperatures of any nests that are relocated because of a Section 933 project.

#### Brandt Island Habitat

- Brant Island is a site of extraordinary nesting numbers of North Carolina's highest priority migratory bird species. In particular, as many as 576 pairs of common terns (*Sterna hirundo*) have nested on the site with as many as 182 pairs of black skimmers (*Rynchops niger*), 175 pairs of state threatened gull-billed terns (*Sterna nilotica*) and 90 pairs of least terns (*Sterna albifrons*). In comparison, the entire nesting population of these four species in North Carolina based on the last statewide census is as follows:

common tern = 1131 nests  
black skimmer = 594 nests  
gull-billed tern = 258 nests  
least tern = 1742

Clearly, Brandt Island is very important to these four colonial nesting species, although habitat quality there is declining because of tall vegetation and increased predator populations. However, other priority species such as Wilson's plovers and American oystercatchers nest on the site each year regardless of the mammalian predators that have managed to populate the area.

- While pumpout of Brandt Island during the nesting season is strongly discouraged, if it does occur, measures should be taken to mitigate for the disturbance. Given the ephemeral nature of waterbird nesting habitat there, we feel it is imperative that pumpout activities be done in a way consistent with the continued use of this site by nesting waterbirds. This will entail a simple modification of the pumpout activities so that a small isolated island is retained with the remaining 5-10 acres in a dome (less than 15 feet above mean high tide) of primarily sand and shell that is void of heavy grass or shrubs. The island should be separated from remaining disposal areas with at least 100 yards of deep water. Whether or not the Section 933 project is implemented, the base plan could also implement the pumpout activities to isolate the nesting island.
- Since Brandt Island serves as habitat for an undescribed skipper, the Commission believes that surveys and subsequent monitoring for this species are appropriate. Information is needed about this

species to assess the impacts of the proposed Brandt Island pumpout, and possibly the subsequent mitigation efforts to create more suitable shorebird habitat.

Additional Shorebird Mitigation

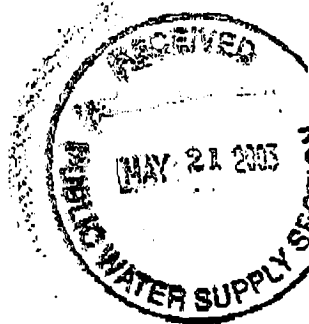
- There are some opportunities to protect the West Point near Bogue Inlet as mitigation for foraging area losses, and perhaps nesting habitat losses, attributable to the Section 933 project and Brant Island pumpout. These measures include year-round posting of mud/sand flats, a year-round leash law for dogs, no driving on the spit and a ban on fireworks and kites. The Commission believes that the magnitude of the proposed project warrants these mitigation efforts.
- The Commission believes year-round bird monitoring on the beach as well as Brant Island should be implemented.

Based on the preceding concerns, the Commission feels that a Finding of No Significant Impact for the proposed project is not appropriate and that an Environmental Impact Statement should be prepared. The Commission appreciates the opportunity to comment on the impacts of the project on fish and wildlife resources. If you need to discuss these comments please call David McHenry at 252/946-6481 extension 345.

cc:

Sugg, M. - US Army Corps of Engineers, Wilmington  
Rice, T. - US Fish and Wildlife Service, Raleigh  
Matthews, K. - US Environmental Protection Agency  
Sechler, R. - National Marine Fisheries Service  
Marshall, M. - NC Division of Marine Fisheries  
Allen, D. - NC Wildlife Resources Commission  
Cameron, S. - NC Wildlife Resources Commission  
Godfrey, M. - NC Wildlife Resources Commission  
Stephenson, J. - NC Coastal Federation

05-0517



**MEMORANDUM**

**TO:** Jim McRight  
Public Water Supply

**FROM:** Patti Fowler  
Shellfish Sanitation and Recreational Water Quality Section

**DATE:** May 20, 2003

**SUBJECT:** Environmental Assessment – US Army Corps of Engineers – Morehead  
City Harbor Project – Place beach material on Bogue Banks

The Shellfish Sanitation and Recreational Water Quality Section would have no objection to the above mentioned project provided that beach disposal occurs only between November 1 and April 30, when recreational usage is low and that clean sand is used and not dredged sand from closed shellfishing areas. If beach disposal was to occur at times other than stated above or if sand from a closed shellfishing area is to be used, a swimming advisory may be posted and a press release may be made. Please notify this office when such disposal occurs.



**North Carolina Department of Environment and Natural Resources  
Division of Coastal Management**

**Michael F. Easley, Governor**

**Donna D. Moffitt, Director**

**William G. Ross Jr., Secretary**

**June 5, 2003**

**MEMORANDUM**

**To: Ms. Melba McGee - Environmental Coordinator  
DENR Office of Legislative and Intergovernmental Affairs  
C/O Archdale Bldg  
Raleigh, NC**

**From: Guy C. Pearce, Consistency Coordinator-Division of Coastal Management**

**Subject: Project Number SCH03-0315, Dated 05/01/2003  
Draft Environmental Assessment-Morehead City Harbor Dredging/Spoil Disposal  
Proposed by: U.S. Army Corps of Engineers  
Location: Carteret County**

**Dear Ms. McGee:**

The subject project is currently under a consistency review by the Division. Our office will make comments on the proposed project during the consistency determination. If you have any questions, or wish to discuss this matter further, please contact me at (919) 933-2293 ext 249. Thank you.

**C: DCM Files**

**1638 Mail Service Center, Raleigh, North Carolina 27699-1638  
Phone: 919-733-2293 \ FAX: 919-733-1495 \ Internet: [www.nccoastalmanagement.net](http://www.nccoastalmanagement.net)**

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## INTERGOVERNMENTAL REVIEW - PROJECT COMMENTS

After review of this project it has been determined that the DENR permit(s) and/or approvals indicated may need to be obtained in order for this project to comply with North Carolina Law. Questions regarding these permits should be addressed to the Regional Office indicated on the reverse of this form. All applications, information and guidelines relative to these plans and permits are available from the same Regional Office.

	PERMITS	SPECIAL APPLICATION PROCEDURES or REQUIREMENTS	Normal Process Time (Statutory Time Limit)
<input type="checkbox"/>	Permit to construct & operate wastewater treatment facilities, sewer system extensions & sewer systems not discharging into state surface waters.	Application 90 days before begin construction or award of construction contracts. On-site inspection. Post-application technical conference usual.	30 days (90 days)
<input type="checkbox"/>	NPDES-permit to discharge into surface water and/or permit to operate and construct wastewater facilities discharging into state surface waters.	Application 180 days before begin activity. On-site inspection preapplication conference usual. Additionally, obtain permit to construct wastewater treatment facility-granted after NPDES. Reply time, 30 days after receipt of plans or issue of NPDES permit-whichever is later.	90 - 120 days (N/A)
<input type="checkbox"/>	Water Use Permit	Preapplication technical conference usually necessary	30 days (N/A)
<input type="checkbox"/>	Well Construction Permit	Complete application must be received and permit issued prior to the installation of a well.	7 days (15 days)
<input type="checkbox"/>	Dredge and Fill Permit	Application copy must be served on each adjacent riparian property owner. On-site inspection. Preapplication conference usual. Filling may require Easement to Fill from N.C. Department of Administration and Federal Dredge and Fill Permit.	55 days (90 days)
<input type="checkbox"/>	Permit to construct & operate Air Pollution Abatement facilities and/or Emission Sources as per 15 A NCAC (2Q.0100, 2Q.0300, 2H.0600)	N/A	60 days
<input type="checkbox"/>	Any open burning associated with subject proposal must be in compliance with 15 A NCAC 2D.1900	N/A	60 days (90 days)
<input type="checkbox"/>	Demolition or renovations of structures containing asbestos material must be in compliance with 15 A NCAC 2D.1110 (a) (1) which requires notification and removal prior to demolition. Contact Asbestos Control Group 919-733-0620.		
<input type="checkbox"/>	Complex Source Permit required under 15 A NCAC 2D.0800		
<input checked="" type="checkbox"/>	The Sedimentation Pollution Control Act of 1973 must be properly addressed for any land disturbing activity. An erosion & sedimentation control plan will be required if one or more acres to be disturbed. Plan filed with proper Regional Office (Land Quality Section) at least 30 days before beginning activity. A fee of \$40 for the first acre or any part of an acre.		20 days (30 days)
<input type="checkbox"/>	The Sedimentation Pollution Control Act of 1973 must be addressed with respect to the referenced Local Ordinance.		30 days
<input type="checkbox"/>	Mining Permit	On-site inspection usual. Surety bond filed with DENR. Bond amount varies with type mine and number of acres of affected land. Any are mined greater than one acre must be permitted. The appropriate bond must be received before the permit can be issued.	30 days (60 days)
<input type="checkbox"/>	North Carolina Burning permit	On-site inspection by N.C. Division of Forest Resources if permit exceeds 4 days	1 day (N/A)
<input type="checkbox"/>	Special Ground Clearance Burning Permit-22 counties in coastal N.C. with organic soils.	On-site inspection by N.C. Division of Forest Resources required "if more than five acres of ground clearing activities are involved. Inspections should be requested at least ten days before actual burn is planned."	1 day (N/A)
<input type="checkbox"/>	Oil Refining Facilities	N/A	90 - 120 days (N/A)
<input type="checkbox"/>	Dam Safety Permit	If permit required, application 60 days before begin construction. Applicant must hire N.C. qualified engineer to: prepare plans, inspect construction, certify construction is according to DENR approved plans. May also require permit under mosquito control program, and a 404 permit from Corps of Engineers. An inspection of site is necessary to verify Hazard Classification. A minimum fee of \$200.00 must accompany the application. An additional processing fee based on a percentage of the total project cost will be required upon completion.	30 days (60 days)

	PERMITS	SPECIAL APPLICATION PROCEDURES or REQUIREMENTS	Normal Process Time (Statutory Time Limit)
<input type="checkbox"/>	Permit to drill exploratory oil or gas well	File surety bond of \$5,000 with DENR running to State of N.C. conditional that any well opened by drill operator shall, upon abandonment, be plugged according to DENR rules and regulations.	10 days (N/A)
<input type="checkbox"/>	Geophysical Exploration Permit	Application filed with DENR at least 10 days prior to issue of permit. Application by letter. No standard application form.	10 days (N/A)
<input type="checkbox"/>	State Lakes Construction Permit	Application fees based on structure size is charged. Must include descriptions & drawings of structure & proof of ownership of riparian property.	15 - 20 days (N/A)
<input type="checkbox"/>	401 Water Quality Certification	N/A	55 days (130 days)
<input type="checkbox"/>	CAMA Permit for MAJOR development	\$250.00 fee must accompany application	60 days (130 days)
<input type="checkbox"/>	CAMA Permit for MINOR development	\$50.00 fee must accompany application	22 days (25 days)
<input type="checkbox"/>	Several geodetic monuments are located in or near the project area. If any monument needs to be moved or destroyed, please notify: N.C. Geodetic Survey, Box 27687 Raleigh, N.C. 27611		
<input type="checkbox"/>	Abandonment of any wells, if required must be in accordance with Title 15A Subchapter 2C.0100.		
<input type="checkbox"/>	Notification of the proper regional office is requested if "orphan" underground storage tanks (USTS) are discovered during any excavation operation.		
<input type="checkbox"/>	Compliance with 15A NCAC 2M 1000 (Coastal Stormwater Rules) is required.		45 days (N/A)
*	Other comments (attach additional pages as necessary, being certain to cite comment authority)		

### REGIONAL OFFICES

Questions regarding these permits should be addressed to the Regional Office marked below.

☐ **Asheville Regional Office**  
59 Woodfin Place  
Asheville, N.C. 28801  
(828) 251-6208

☐ **Mooresville Regional Office**  
919 North Main Street  
Mooresville, N.C. 28115  
(704) 663-1699

☒ **Wilmington Regional Office**  
127 Cardinal Drive Extension  
Wilmington, N.C. 28405  
(910) 395-3900

☐ **Fayetteville Regional Office**  
225 Green Street, Suite 714  
Fayetteville, N.C. 28301  
(910) 486-1541

☐ **Raleigh Regional Office**  
3800 Barrett Drive, P.O. Box 27687  
Raleigh, N.C. 27611  
(919) 571-4700

☐ **Winston-Salem Regional Office**  
585 Woughtown Street  
Winston-Salem, N.C. 27107  
(336) 771-4600

☐ **Washington Regional Office**  
943 Washington Square Mall  
Washington, N.C. 27889  
(252) 946-6481



THE UNIVERSITY OF NORTH CAROLINA  
AT  
CHAPEL HILL

Institute of Marine Sciences  
252-726-6841  
FAX: 252-726-2426

The University of North Carolina at Chapel Hill  
3431 Arendell Street  
Morehead City, North Carolina 28557



28 May 2003



Chrys Baggett  
State Clearinghouse  
NC Department of Administration  
1302 Mail Service Center  
Raleigh, NC 27699-1302

Re: NEPA EA for US ACE 933 Project for  
Morehead City Harbor-Bogue Banks  
placing 13 miles of dredge material

Dear Dr. Baggett:

I write in response to my review of the EA for the deposition of dredged materials on 13 miles of the Bogue Banks beaches as part of a proposed 933 project. I serve as a member of the NC Environmental Management Commission, the Chair of the Water Quality Committee, a member of the Inter-commission Team on Coastal Habitat Protection Plan for fisheries, a member of the Science Panel on Coastal Hazards for the NC Coastal Resources Commission, and a two-term former member of the NC Marine Fisheries Commission. I also am professor of marine ecology at UNC, with extensive experience on sand beach ecology. Thus I have both management and scientific experience and expertise.

The EA is so grossly inadequate in its failure to treat cumulative impacts as to be in full violation of NEPA at the federal level and its state counterpart. Specifically, the beaches of Pine Knoll Shores, Salter Path, and part of Indian Beach were already nourished in winter 2001-2. The benthic biological communities of the beach and the shorebirds that utilize them as vital prey have not yet recovered from that event that occurred over one and a half years ago. I have data on this absence of recovery that I am happy to share and have shared with federal and state agencies from an ongoing monitoring project that we are conducting under Sea Grant funding. This EA violates NEPA and the state counterpart in the area of cumulative impacts in two ways. First, there is no mention and analysis of the cumulative impacts issue. So there is a procedural violation. Second, the available information known to the US ACE and to DENR from

our research on the last nourishment is not used to construct a credible evaluation of how a second perturbation will affect the beach ecosystem and its ecosystem services to fish and wildlife before recovery from the first one has even occurred. The spatial issue of cumulative impacts also needs attention because the majority of the western end of Bogue Banks has also been nourished and our data show that this project has had a huge impact on the benthic invertebrates and vertebrate consumers as of the present date. Many of these species would normally help in recovery of eastern Bogue Banks through migration but cannot because they are depleted in the potential source area. Both temporal and spatial aspects of cumulative effects are utterly ignored in this EA.

In addition to ignoring cumulative impacts of multiple beach nourishment projects within a 2+year period, the EA fails to evaluate the known impacts of previous beach nourishments on Bogue Banks. Bogue Banks has relatively little long-shore transport and perhaps for that reason has slow recolonization and recovery rates of beach invertebrates. Transport and immigration of beach invertebrates is not achieved over long distances under low longshore transport conditions. The failure to recover promptly creates important impacts on fisheries habitat in direct contradiction to the NC Fisheries Reform Act of 1987 and its focus on enhancing fisheries habitat through the CHPP process. This impact is especially serious for Florida pompano, Gulf kingfish, and flounders, all of which use the surf zone and beach invertebrate prey as primary nursery. The EA claim of perhaps as short as two months until recovery is unrealistic in light of known durations of impact from previous Bogue Banks nourishments.

Finally, the plan for 16 months of continuous project activity through the biologically productive warm months violates the tenets of minimization and avoidance in environmental management. Such a plan is certain to cause higher impacts on habitat usage and recruitment of surf fish and shorebirds. There is no justification except financial and the only reason it is cheaper is that no mitigation is proposed. All the costs to public trust resources are externalized so as to create a false economy. If summertime activity is desired, then proper habitat mitigation should be included. Project activity in summertime will also have a large economic impact on the hotel, hospitality, and tourism business on Bogue Banks, an impact not addressed in the EA and not compensated for in the plan.

Sincerely,

A handwritten signature in dark ink, appearing to read "CH Peterson".

Charles H. Peterson  
Alumni Distinguished Professor of Marine Sciences  
University of North Carolina at Chapel Hill

e

ENVIRONMENTAL DEFENSE

finding the ways that work

June 2, 2003



Ms. Chrys Baggett  
State Clearinghouse  
1302 Mail Service Center  
Raleigh, N.C. 27699-1302

**RE: Draft Evaluation Report and Environmental Assessment -- Bogue Banks/Morehead  
City Harbor Section 933 Project**

Dear Mr. Heine,

Please accept these brief comments regarding the aforementioned project on behalf of Environmental Defense and our members in North Carolina. First and foremost, we believe that a full EIS, rather than an Environmental Assessment, is warranted. Clearly, there will be environmental impacts from this project, and in light of the significant impacts from previous beach nourishment projects on Bogue Banks a more thorough analysis is needed. We have the following specific concerns:

- The cumulative impacts analysis is non-existent with regard to biological resources and includes no data. It is merely a comparison of the percentage of area being impacted by sand deposition activities and does not even address differences in habitat quality which might occur along the ocean beaches. Dr. Charles H. (Pete) Peterson has conducted several studies examining the recovery rates of intertidal infauna on Bogue Banks, and his findings are not nearly as optimistic as the conclusion stated in the EA. A full EIS which incorporates these data is necessary. Lack of recovery of these species has the potential to significantly affect shorebird populations.
- There is no pre- or post-project monitoring plan. Although there is a commitment to monitor and relocate sea turtle nests should construction occur during the nesting season, this only applies during the construction period. It should be clear from the sand placement activities which occurred on Emerald Isle and Pine Knoll Shores the past two seasons that biological monitoring must be a required component of any beach nourishment activities. The EA states that because the project is "one time only", it is not "appropriate for adaptive management". The sand placement activities at Emerald Isle and Pine Knoll Shores were also part of a one time event. Without monitoring and data collection, there is no justification for the assertion that recovery of biological communities will be quick and complete.

- The sediment analysis for source material from Brandt Island was performed over 10 years ago and must be updated, particularly in light of the poor quality of material placed on the beaches at Pine Knoll Shores and Emerald Isle during the past two seasons. The borrow site for those sand placement events was supposedly thoroughly sampled and analyzed, yet failed to reveal the presence of tires and cobble-sized material. Furthermore, an analysis of the potential biological impacts of placing finer grained materials on top of the very coarse material already on the beach needs to be performed.

We have many other concerns regarding the impacts of turbidity to surf-dwelling fish species, as well as species which use the nearshore subtidal environment as overwintering habitat, but wanted to highlight the specifics above. Thank you for your consideration and for the opportunity to comment on projects which impact our coastal public trust resources.

Sincerely,



Michelle Duval, Ph.D.  
Scientist

***Bogue Banks Environmental Stewardship Corporation***

Post Office Box 475  
Snow Hill, NC 28580

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May 16, 2003

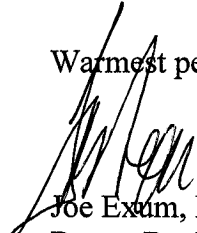
Mr. Steve Aiken  
Chief Of Operations Wilmington District USACE  
Wilmington, NC 28402

Dear Mr. Aiken,

Please have someone on your staff review the attached comment to the United States Army Corps of Engineers (USACE) The Port of Morehead City, N.C., Beaufort Inlet, ***EVALUATION AND ENVIRONMENTAL ASSESSMENT REPORT***. I am submitting this comment on behalf of our membership to the Wilmington District, United States Army Corps of Engineers

Permitting and funding of this project are essential to preserve one of North Carolina's oldest and most precious natural resources: Bogue Banks. If you have questions, please contact me at 252-747-2911 or at home 252-522-4229.

Warmest personal regards,



Joe Exum, Executive Director  
Bogue Banks Environmental Stewardship Committee

Cc: The Honorable William Ross, Director  
Department of Environment and Natural Resources

COMMENTS

On the

**United States Army Corps of Engineers (USACE) 933 Project**

**The Port of Morehead City, N.C., Beaufort Inlet**

***EVALUATION AND ENVIRONMENTAL ASSESSMENT REPORT***

May 12, 2003



Joe Exum, Executive Director

*Bogue Banks Environmental Stewardship Corporation*

Post Office Box 475

Snow Hill, North Carolina 28580

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To: Mr. Steve Aiken  
Mr. Glenn McIntosh  
*The United States Army Corps of Engineers (USACE)*  
Wilmington District

From: Joe Exum, Executive Director  
*Bogue Banks Environmental Stewardship Corporation (BBESC)*

Date: May 11, 2003

Subject: **Evaluation & Environmental Impact Assessment USACE Morehead City, Beaufort Inlet 933 Maintenance Project**

**Introductory Remarks:**

The *BBESC* was incorporated in June of 2001. The membership consists of 281 homeowners along Bogue Banks. The goal of our organization is simple:

*We are seeking a similar sand management system used by the **United States Army Corps of Engineers (USACE)** to maintain Wilmington Harbor and Cape Canaveral Harbor in Florida to be put into practice at Morehead City Harbor. Sand presently being removed from the littoral system by **USACE** in maintenance of Beaufort Inlet and dumped at sea must be put on adjacent beaches*

In a meeting requested by the *BBESC* and held in Raleigh in August of 2002, representatives from the *Department of Environment and Natural Resources*, including the *Department of Water Resources* and the *Department of Coastal Management (DCM)*, along with representatives from the *USACE* Wilmington District, Mr. Aiken was requested to consider a maintenance project for Beaufort Inlet that would combine outer and inner harbor sediment disposal practices in which spoils could be distributed along adjacent beaches west to Indian Beach. The *Morehead City Harbor/Beaufort Inlet Proposed 933 Project* is the answer for which we had hoped.

### **Brief History of Accelerated Erosion Rates at Pine Knoll Shores since 1993:**

The dry beach at Pine Knoll Shores actually accreted from 1987 to 1992. My home was built in 1987 with a 100' setback. My neighbor built in 1992. His footprint is five feet in front of mine. The 1993 *Morehead City Harbor Project* deepened Beaufort Inlet from 40' to 47' and broadened the inlet 100' to 450'. In 1994, Hurricane Gordon brushed the eastern coast of North Carolina in November. Although the effects on the eastern end of the island were minimal, the primary vegetation line from Pine Knoll Shores to Emerald Isle was devastated. Pine Knoll Shores and Emerald Isle have never recovered from Hurricane Gordon, and each successive hurricane has wreaked havoc with 1000 year old sand ridges, Maritime forests, and turtle sanctuaries. **(Please see the attached newspaper account.)**

In the *Morehead Improvement Design Memorandum & Environmental Assessment* in March of 1992, the USACE describes the berm design as:

“...a feeder berm which purpose is to keep the material within the littoral system... This berm is not intended to replenish the beach... The existing disposal method... removes the sand from the littoral system entirely...”

In 1994, at the Request of the N.C. Department of Coastal Management (DCM), the USACE ceased disposal of dredged material on the Offshore Dredged Material Disposal Site (ODMDS) “when weather permitted” and disposed of the sand on a newly created near shore berm in expectation the sand would return to the active littoral system. DCM has observed sand on the near shore berm has **not** returned to the active littoral system over the last 10 years. DCM has notified the USACE on two occasions this disposal practice is not consistent with the North Carolina Coastal Zone Management Plan. In October of 2002, “disposal of sand outside the active littoral system” was forbidden by North Carolina statute.

There is no definitive sediment transport study for Bogue Banks and according to the June 2001 USACE 111 Study we do not have time to assign blame for the accelerated erosion rates since 1993:

...The overall net loss of littoral sediment from the beaches adjacent to Beaufort Inlet between 1936 and 1994 is 19,205,5000 cubic yards... Beaufort Inlet, in particular, and Morehead City Harbor in general, has trapped littoral material at a higher rate each time the project has been deepened... The offshore profiles six miles west of Beaufort Inlet and all of Shackleford Banks appear to be getting steeper, closer to shore. These offshore changes appear to be directly related to the deflation or deepening of the ebb tide delta of Beaufort Inlet, which is a direct impact of the dredging operations. Unfortunately, the shoreline data does not demonstrate an impact at this time. However, the continuing deepening of the offshore profile is a major concern that needs to be addressed. —Section 111 June 2001

Our organization believes this 933 *Project Proposal* is the USACE good faith effort to incorporate disposal practices consistent with the *May 2000 Wilmington Harbor Environmental Assessment*, which articulates the geological correlation principle between sediment removal and beach erosion.

*"...the impact of sediment removal...tends to be diffused throughout the impacted area. Since this diffusion process can extend over miles of shoreline, the erosive impact of the sediment removed from the navigation channel and its deposition outside the active littoral zone is difficult to detect in the short term... Years of research by USACE and practical knowledge gained from the operation of the numerous coastal navigation projects dictate this material must be conserved...the removal of a cubic yard of littoral sediment from a tidal entrance or inlet with deposition outside the active littoral zone of the beach will ultimately cause a cubic yard deficit somewhere within the sand sharing system... The impact of the removal of littoral sediment from the active littoral zone through channel maintenance is identified as a major cause of man-induced erosion."*

The years of research by USACE and practical knowledge gained there from are confirmed in Dr. Orin Pilkey's 1975 novel, ***Living With an Island:***

- *The cause of erosion on Bogue Banks (Atlantic Beach/Ft. Macon Park) is not altogether certain. ... A significant part, however, is very likely due to hopper dredging. Hopper dredging consists of removing the sand from channels and dumping it at sea, entirely out of the shoreline system. Thus, sand that would naturally drift across and replenish the beach is lost and erosion rates increase. This is a major problem nationwide.*

### **Environmental Concerns:**

During the permitting process, various government agencies and environmental groups will raise the following environmental concerns.

1. Shell content.
2. Microbial life recovery
3. "Fish Feed" life recovery
4. Coquina, mole crab, destruction
5. Various avarian concerns

There has never been an incident of sand bypassing/beach nourishment in which microbial life did not recover. Turtle sanctuaries are reinvigorated, maritime forests flourish, and 1000-year-old sand ridges become a new line of primary vegetation. The east end of Bogue Banks is testimony to a beach that recovers its natural vegetation and wildlife following renourishment.

### **Conclusion:**

Section 209 of PL 91-611 (WRDA 1970) states:

*It is the intent of Congress that the objectives of enhancing regional economic development, the quality of the total environment, including its protection and improvement, the well-being of the people of the United States, and the national economic development are the objectives to be included in federally financed water resource projects, and in the evaluation of benefits and cost attributable thereto.*

In the cost benefit equation the environmental concerns raised during previous renourishment projects must be weighed against the benefits derived from beach nourishment during initial storm surges. A recent article published by the **North Carolina Sea Grant** program concluded:

*The benefits (of beach renourishment) are actually more dramatic than implied... All of the threatened buildings listed for the three communities were located outside the nourishment project limits or in transition areas at the ends of the projects where the dunes were not constructed. Hurricanes Floyd and Dennis threatened or destroyed 968 buildings outside the three Corps-designed nourishment projects' manmade dunes. Remarkably, not even one building behind the project dunes was threatened by erosion — that's ZERO. (Wrightsville, Kure, and Carolina Beach)*

Failure to permit or fund the project will eventually result in catastrophic loss of property. A chilling review of the USACE *Final Section 111 Feasibility Report: Morehead City Harbor: June, 2001*, by Olsen Associates articulates the consequences.

*Indeed, from a coastal engineering or geology standpoint, it is well known that removal of littoral material in excess of natural conditions results in (erosion) of the shorelines within the littoral system. The significant deflation of the offshore beach profiles documented in the study...must ultimately translate to destabilization of the beach and shoreline...the beach profile cannot continue to steepen without resulting in a landward translation of the shoreline. The condition is analogous to the foundation of a house: i.e., a structure's foundation cannot continue to be undermined without ultimate destabilization of that structure.*

Joe Exum, Executive Director  
Bogue Banks Environmental Stewardship Committee



## ENVIRONMENTAL DEFENSE

finding the ways that work

June 2, 2003

Mr. Hugh Heine  
Wilmington District  
U.S. Army Corps of Engineers  
P.O. Box 1890  
Wilmington, NC 28402

**RE: Draft Evaluation Report and Environmental Assessment -- Bogue Banks/Morehead City Harbor Section 933 Project**

Dear Mr. Heine,

Please accept these brief comments regarding the aforementioned project on behalf of Environmental Defense and our members in North Carolina. First and foremost, we believe that a full EIS, rather than an Environmental Assessment, is warranted. Clearly, there will be environmental impacts from this project; in light of the significant impacts from recent beach nourishment projects on Bogue Banks a more thorough analysis is needed. We have the following specific concerns:

- **Cumulative Impacts:** The cumulative impacts analysis is non-existent with regard to biological resources and includes no data. It is merely a comparison of the percentage of area being impacted by this project versus sand deposition activities throughout the state. No attempt is made to address differences in habitat quality which might occur along the ocean beaches, or . Dr. Charles H. (Pete) Peterson has conducted several studies examining the recovery rates of intertidal infauna on Bogue Banks, and his findings are not nearly as optimistic as the conclusion stated in the EA. A full EIS which incorporates these data and evaluates the impact of the project on the recovery rates of intertidal infauna is necessary. Lack of recovery of these infaunal species has the potential to significantly affect shorebird populations.
- **Monitoring:** There is no pre- or post-project monitoring plan. There is only a commitment to monitor and relocate sea turtle nests should construction occur during the nesting season. It should be clear from the sand placement activities which occurred on Emerald Isle and Pine Knoll Shores the past two winters that biological monitoring at the placement site and the mine site must be a required component of any beach nourishment project. The EA states that because the project is "one time only", it is not "appropriate for adaptive management". The sand placement activities at Emerald Isle and Pine Knoll Shores are also part of a one time only project. Without monitoring and data collection, there is no justification for the assertion that recovery of biological communities will be rapid and complete.

- Sediment Analysis: The sediment analysis for source material from Brandt Island was performed over 10 years ago and must be updated, particularly in light of the poor quality of material placed on the beaches at Pine Knoll Shores and Emerald Isle during the past two seasons. The borrow site for those sand placement events was supposedly thoroughly sampled and analyzed, yet failed to reveal the presence of tires and cobble-sized material. In addition, an analysis of the potential biological impacts of placing presumably finer grained materials on top of the very coarse material already on the beach needs to be performed. Finally, the composition of the material at Brandt Island could alter the frequency and duration of the turbidity plume and therefore, impacts to surf zone fish species their prey.

Again, we must emphasize that the certain impacts from this project warrant the development of a full EIS with a comprehensive analysis of cumulative impacts. Until such time as an EIS is prepared and the concerns expressed above are addressed, we cannot support this project. Thank you for your consideration and for the opportunity to comment on projects which impact our coastal public trust resources.

Sincerely,



Michelle Duval, Ph.D.  
Scientist



3609 Highway 24 (Ocean) Newport, NC 28570

June 2, 2003

Hugh Heine  
District Engineer  
U.S. Army Engineer District, Wilmington  
P.O. Box 1890  
Wilmington, NC 28402

Re: Draft Evaluation Report and Environmental Assessment, Morehead City Harbor,  
Section 933, Carteret County, North Carolina

Dear Mr. Heine:

The North Carolina Coastal Federation staff has reviewed the document entitled *Draft Evaluation Report and Environmental Assessment, Morehead City Harbor, Section 933, Carteret County, North Carolina*. The following represents our comments on the document and the project.

If there is one lesson we have learned from our experience in reviewing and critiquing beach renourishment projects over the past four years, it is that haste makes waste. Whenever the applicants and/or the Corps of Engineers have sought expedited or cursory review of projects, including the local beach renourishment projects on Bogue Banks, the Sea Turtle Restoration Project on Oak Island, and the Mason Inlet Relocation Project, the projects have been laden with unexpected environmental problems. In the interest of time, the Corps chose not to proceed with an EIS in either the Bogue Banks and Mason Inlet projects. In the Oak Island Sea Turtle Restoration Project, the Corps failed to adequately characterize the sediment at the Yellow Banks disposal area, and boulders were pumped onto the beach. More boulders are uncovered on the Oak Island beach with each high tide even today, several years after project completion.

We strongly recommend that an environmental impact statement (EIS) be prepared for this 933 project. Recommendations that an EIS be conducted were made to the Corps by federal and state resource agencies during the scoping period. If the Corps is not willing to recognize the appropriateness and necessity of an EIS for this project, we will recommend that the Division of Coastal Management find the project inconsistent with state policies due to the potential environmental impacts described in this letter.

#### Alternatives

The alternatives analysis should include an alternative that spreads the pump out of Brandt Island over several seasons. The Environmental Policy Act requires the Corps to evaluate an alternative that would avoid environmental impacts, in addition to the no

*"Citizens Working Together For A Healthy Coast"*

Phone: 252-393-8185 • Fax: 252-393-7508 • Email: [nccf@nccoast.org](mailto:nccf@nccoast.org) • Website: [www.nccoast.org](http://www.nccoast.org)



Mr. Hugh Heine  
June 2, 2003

action alternative. In this case the no action alternative is identical to the existing authority to dispose of dredged material on the beaches of Fort Macon and Atlantic Beach. The Corps must also analyze a less damaging practicable alternative that would avoid, rather than minimize, environmental impacts by honoring the moratorium for shorebirds as established by the NC Wildlife Resources Commission and for fisheries as established by the NC Marine Fisheries Commission. These moratoria would limit the period for beach disposal of sediment to November 16 until March 31. While it is clear that this alternative would require the redeployment of pipelines and other equipment in future years, it is an alternative that requires further analysis and public review. We request that the Corps include an analysis of this alternative in its EIS.

#### Project Timetable

The Draft 933 Environmental Assessment proposes to pump out Brandt Island and place sediment material on the beach from Fort Macon State Park to Indian Beach for 16 consecutive months. The NC Wildlife Resources Commission and the NC Marine Fisheries Commission have established moratoria on beach fill activities that would limit construction to the period from November 16 to March 31. These moratoria were developed to protect the food sources for migrating shorebirds and fish in the surf zone during periods of peak biological activity. The Draft EA is inconsistent with state policies inasmuch as it proposes to violate these moratoria.

#### Economic Impact

The Draft 933 EA has determined that the benefits of this project outweigh the costs by a factor of 4.9 to 1. The singular argument made by the Corps in its EA for conducting nonstop beach fill activities for 16 consecutive months is the increased redeployment cost of pipelines and other equipment in future years if the project was required to honor the NC Wildlife Resources Commission and NC Marine Fisheries Commission moratoria policy on the placement of fill on the beach during periods of high biological activity. Given the high benefit to cost ratio established in the economic impact analysis, the cost of redeploying pipeline and other equipment is a reasonable and practicable expense. The cost of mobilization and deployment is estimated to be \$2.85 million. If the cost of redeploying pipeline and other equipment were added to the costs of the project, the benefit to cost ratio would still be approximately 4 to 1. Given this generous benefit to cost ratio, there is no compelling economic argument not to honor the moratoria.

The Draft 933 EA estimates the benefits of the 933 project using storm damage reduction savings and recreational benefits to day users, among other criteria. During 2001-2002, a locally funded beach renourishment project was conducted on the same beaches (Pine Knoll Shores, Salter Path and Indian Beach) that are under consideration in the Draft 933 EA. The locally funded project was reviewed and permitted by the Corps of Engineers Wilmington District. The longevity of the locally funded project was ten years. The locally funded project also projected storm damage reduction savings and benefits to day users, among other criteria. The Draft 933 EA also has a projected life of ten years. Both projects propose to save the same oceanfront and second row structures from storm damage and long term erosion. The Draft 933 EA is in effect double counting benefits



Mr. Hugh Heine  
June 2, 2003

that have already accrued to the protection of structures and recreation on Pine Knoll Shores, Salter Path and Indian Beach. Since the Corps of Engineers reviewed and approved the locally funded economic impact analysis, these benefits should serve as a baseline upon which the additional benefits of the 933 project can be calculated. The question is how much additional benefit will these same said structures and beachgoers receive over and above the benefits provided by the locally funded beach fill project? If the locally funded project did not meet its objectives, then what is the revised lifespan of the locally funded project and what is the revised baseline, i.e. costs and benefits, of the locally funded project?

The Corps should also explain why it uses a 20-year period for its cost benefit analysis when the project is only expected to last 10 years. The use of a 20-year period is particularly important inasmuch as the Corps is also evaluating a 50-year civil works project for the entirety of Bogue Banks that is expected to be built prior to the end of the 10-year life of the proposed 933 project. We question whether the proposed 933 project has any economic benefits that have not already been realized by the locally funded project, or that will be realized by the 50-year civil works project.

#### Environmental Impacts/Cumulative Impacts

The Draft 933 EA fails to seriously consider the environmental impacts and the cumulative impacts of the proposed 933 project on biological resources on Pine Knoll Shores, Salter Path and Indian Beach. The locally funded project has had a devastating effect on macro faunal invertebrates on these beaches as documented by Peterson, et al. The Draft EA fails to consider any biological monitoring data from scientists such as Peterson or from the local project's biologist. The Draft 933 EA examines the impact of beach fill projects in the abstract, rather than evaluating the wealth of current data that is available for these beaches. The question that should have been addressed in the Draft 933 EA and which must be examined in the EIS is what is the cumulative biological impact of burying invertebrates on beaches that have not fully recovered? In addition, fill material that is widely regarded as incompatible was placed on a significant portion of Emerald Isle. The question this Draft EA failed to consider is what is the cumulative impact on birds, fish, and invertebrates of conducting another beach fill project before the beach ecosystem has had time to reestablish itself? As the Draft 933 EA notes, the recovery rates for beach ecosystems is generally from 1 to 3 years. The timeframe is shorter when beach material is compatible and longer when beach material is not compatible. These are questions that will require close examination of existing research as well as field studies that are appropriate to the EIS.

#### Sediment Compatibility

The draft environmental document is the appropriate vehicle to publicly share data collected on a given project. In the Draft 933 EA, the Corps shares its belief (ER-43) and provides assurance (ER-44) that the sediment will be compatible with the natural beach and for sea turtle nesting. The Draft 933 EA indicates that data will be collected on sand compatibility along portions of the proposed project area, but this data is not contained in the Draft EA and is not available for public review. All relevant data must be included in

Mr. Hugh Heine  
June 2, 2003

draft environmental documents. The public has a right to comment on data, not beliefs and assurances, particularly given the Corps' past acceptance of incompatible material on Bogue Banks, Oak Island and from Mason Inlet.

#### Public Access and Parking

The Corps' guidelines require public access in order for the federal government to share in the costs of a storm damage reduction project. These guidelines for public access and parking indicate "public use means use by all on equal terms." The public access and parking plan in the Draft 933 EA presents a stark disparity between public access and parking sites along the project area. It is remarkable that the areas that provide the greatest public access, Fort Macon State Park, are slated to receive the same volume of sand as areas with the least amount of public access.

The Corps conducted its public access survey using aerial photography taken between 11:15 AM and 11:40 AM on July 4, 2002. The Town of Pine Knoll Shores had only one public access site open on that date, which was opened during a June 28 ribbon cutting. On the day of the Corps' survey, Pine Knoll Shores was essentially a privately accessed beach. It is not feasible to evaluate public access on a privately accessed beach. We also question how the time between 11:15 and 11:40 on a single day constitutes peak hour demand. I personally have traveled to the state beach access at Salter Path on numerous occasions to find the lot full and cars parked illegally on Highway 54.

The survey methodology is seriously flawed, as are the results. We strongly recommend that the Corp follow through on the revised parking survey methodology as described in Appendix E-5 to revisit the parking issue this summer. The revised parking survey should also be conducted on multiple peak days and at a variety of times and locations on those days.

The access plan for Pine Knoll Shores is a violation of Corps guidelines governing public use. The Corps guidelines for public use states:

*Lack of sufficient parking facilities for the general public (including non-resident users) located reasonably near and accessible to the project beaches or lack of public pedestrian rights-of-way to the beaches at suitable intervals would constitute de facto restriction on public access and use of such beaches, thereby precluding eligibility for Federal assistance. EP 1165-2-1 Chapter 14-1(b)(2)*

The use of public transportation by the Town of Pine Knoll Shores to transport visitors from existing beach parking areas to planned beach access areas meets neither the letter or the spirit of the public use definition in Corps guidelines. Historically, Corps guidelines have allowed public transportation, but only "to reduce automobile pollutants by encouraging public transportation." Nowhere has Pine Knoll Shores stated that its motivation is in reducing automobile pollutants and the public access plan would not reduce automobile pollutants anyway.

Mr. Hugh Heine  
June 2, 2003

The Corps has offered no corroborating data from any comparable beach community to justify that this experiment will provide any benefit to day users of the beaches at Pine Knoll Shores. Why would a day user park near the beach and then take a shuttle to another access area? Is the public expected to carry cellular phones in order to reach the public transportation carrier during the off-season? Unless the Corp can provide data and justification that this transportation system has worked in a town setting similar to Pine Knoll Shores, we strongly recommend that the project be scrapped.

In our view, the primary purpose of the public transportation plan is to gain a higher percentage of federal cost share funds. It is not clear to us that the Town of Pine Knoll Shores has exhausted all practical options in providing appropriate parking at each proposed access site. There are gated private parking lots within walking distance to the beach that could be purchased or condemned that could accommodate ten or more parking spaces.

The public transportation plan does not provide a realistic alternative for the public to access what will continue to be privately accessible beaches. By accepting the flawed concept of public transportation to reach multiple beach accesses in Pine Knoll Shores, the Corps has violated public faith in the notion that Federal funds will only be used to provide storm damage reduction benefits to beaches that the public can access on an equal basis.

We recommend that the Corps provide the Town of Pine Knoll Shores until November 1, 2004 to meet the public parking criteria that requires a minimum of ten parking places and handicapped access for each beach access within the town limits. If the town cannot meet the public access requirement by that date, the Corps should require the town to pay 100 percent of the cost of placing beach fill on areas that do not conform to the Corps guidelines.

#### State Easements

North Carolina law requires an easement for performing work that involves alterations to state lands. The beach up to the high tide land is state property in North Carolina. Any land disturbing activity requires an easement from the Department of Administration and approval of the Council of State. The Corps should describe how it plans to obtain an easement to alter state lands.

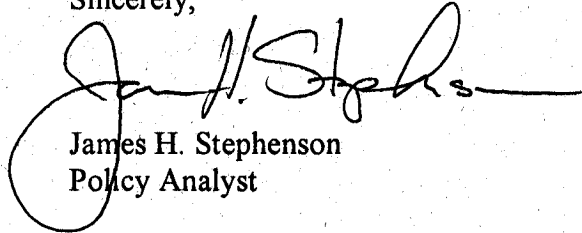
#### Turbidity in the Construction Area

The Draft 933 EA states "Turbidities outside of the construction or mixing zone would not exceed the state standard of 25 NTU's in all saltwater classes." The EA has not indicated how the Section 401 Water Quality Unit defines and delineates the area of construction. The EA also does not indicate when a portion of the beach ceases to be a construction area in time or spatial terms. Research by Peterson, et al, has shown that turbidity continued for months after the completion of beach construction at Emerald Isle. The EIS should evaluate Peterson's data and model the turbidity that will be generated during the proposed project.

Mr. Hugh Heine  
June 2, 2003

Thank you for this opportunity to comment on the Draft 933 Environmental Assessment.

Sincerely,

A handwritten signature in black ink, appearing to read "James H. Stephenson", with a long horizontal flourish extending to the right.

James H. Stephenson  
Policy Analyst

Cc: Chrys Baggett  
State Environmental Policy Act Coordinator

This document contains comments and questions pertaining to the *Draft Evaluation Report and Environmental Assessment: Morehead City Harbor Section 933* and is being submitted to the US Army Corps of Engineers Wilmington District by the Duke University Program for the Study of Developed Shorelines.

## **Comments on Appendix E: Beach Access/Parking Analysis and Requirements**

Appendix E contains a significant number of errors, issues and discrepancies that need to be resolved. The quality of data used to determine current and projected public access and public parking needs is inaccurate; the analyses that rely on this data are flawed; population growth rates used to estimate the future peak hour usage are incorrect and huge discrepancies regarding beach usage remain unresolved. It is also clear that the study area fails to meet Federal Policies and Authorities regarding the geographic distribution of public access and public parking. Specific comments and questions follow:

Determinations of public access, public use and public parking needs and demands are based on one 25-minute observation along a shoreline that is classified as private in Engineering Regulations 1105-2-100 or 1165-2-130.

- What procedures are typically employed by Wilmington District to evaluate public beach use and public parking demands?
- How can the Corps justify its decision to spend tens of millions of taxpayer dollars on this project when it fails to meet the cost-share criteria outlined in Engineering Regulations 1105-2-100 or 1165-2-130?

The EA makes projections based on the amount of public access and parking currently available in the study area, which does not meet the federal cost share guidelines.

- How can the Corps make an accurate estimate of future peak hour demand when the area fails to provide either adequate public access or public parking, as defined in Engineering Regulations 1105-2-100 or 1165-2-130?

In a letter dated May 16, 2003 Colonel Charles Alexander states, "...the US Army Corps of Engineers, Wilmington District intends to ensure the requirements as indicated in US Army Corps of Engineers Engineering Regulations 1105-2-100 and 1165-2-130 are adhered to for this and all shoreline protection projects." However, neither existing Department of the Army public access nor public parking requirements contained in Engineering Regulations 1105-2-100 and 1165-2-130 are being adhered to in the project area.

- Please explain the discrepancy between Colonel Alexander's stated position and the fact that minimum public access and parking requirements as indicated in US Army Corps of Engineers Engineering Regulations 1105-2-100 and 1165-2-130 are not being adhered to.

According to ER 1165-2-130, "In the event public access points are not within one-half mile of each other, either an item of local cooperation specifying such a requirement and public use throughout the project life must be included in project recommendations or the cost sharing must be based on private use." According to Appendix E, public access points are not available, nor are they projected to be available, every one half mile in the project area.

- Since the project area fails to meet existing policies and authorities concerning public access and parking, and since no item of local cooperation specifying such a requirement is provided, why isn't the project being cost-shared based on private use?

According to ER 1165-2-130, public transportation facilities may substitute for or complement parking facilities in some instances in which state and local plans call for a reduction in automobile pollutants.

- Please provide a compilation of all state and local plans that call for a reduction in automobile pollutants in the project area.
- In the absence of such documentation, please provide the specific rules under which the Wilmington District has the authority to allow a public transportation system to serve as a substitute for meeting explicit public access and parking policies and authorities as contained in ER 1165-2-130 and 1105-2-100.
- How many Section 933 projects have allowed public transportation in lieu of providing adequate parking, and where are they located?

On Page E-1, an assumption is made that visitors require 100 square feet of beach per visit.

- Upon what data is this assumption based?

The estimation of peak hour usage/demand is based upon a 25-minute snapshot of beach visitation taken between 11:15 and 11:40 am on July 4, 2002, and the EA assumes that almost the same number of people were under tents and umbrellas than were visible on the beach.

- What was the weather in the study area between 11:15 and 11:40 am on July 4, 2002?
- Is it reasonable to assume that the number of people under a tent or umbrella would be equal to the number of people visible on the beach?
- Upon what data is the assumption that an average of 2 people were under each tent and 1.5 people were under each umbrella based?
- How can peak hour usage/demand be estimated with any degree of accuracy using one 25-minute aerial observation taken on one day of the year?

On page E-2, the EA states that July 4 is assumed to be the peak day of the year for visitors on beaches.

- Upon what data is this assumption based?
- What evidence is available to show that peak beach usage occurs between 11:15 and 11:40 am?

On page E-2, the EA states that a higher number of visitors may have been present if July 4 had fallen on a weekend, and that the actual numbers were increased by 14.2% based on the volume of traffic crossing the two bridges onto Bogue Banks on Friday, July 5.

- Page E-2 states that the assessment completed on July 4 is not accurate. Why wasn't the assessment undertaken on Saturday July 6 or Sunday July 7?
- Since Friday is not typically considered a weekend, why were traffic counts for Friday July 5<sup>th</sup> used instead of traffic counts for Saturday July 6 and/or Sunday July 7?
- What was the actual volume of traffic on each bridge on July 5<sup>th</sup>?
- During what time period was the traffic count conducted on July 5?
- What percentage of traffic crossing these bridges used the beaches in the study area?
- What was the actual traffic volume on each bridge on July 4?
- During what time period was the traffic count conducted on July 4?
- How, exactly, was the figure of 14.2% obtained?

On page E-2, the peak hour demand in the project area is projected to be 2,835 in the year 2014. This figure is based upon an average North Carolina annual growth rate of 1.8% between 2000 and 2010. It is implausible to assume that daily visitors to the project area are, and will be, distributed equally throughout the entire state. A more accurate analysis should assume that the majority of daily visitors to the project area is, and will remain, from North Carolina's coastal region. Therefore, population growth rates specific to North Carolina's coastal municipalities, as contained in 15A NCAC 07B .0701, should have been used to predict future beach and parking demand.

- Why were CRC-approved population growth rates for coastal NC not used in this study?

On page E-2, the EA states that only 30% (59 out of 171) of all available parking spaces in the project area were filled during the peak usage time period between 11:15 and 11:40 am on July 4, 2002. Such a low demand for parking during the stated peak period of demand appears inconsistent with the definition of "peak demand."

- Could this indicate that the peak demand did not actually occur during the time of observation?
- How does the Wilmington District resolve or explain this discrepancy?

On Page E-3, the Corps estimates that each car contains 2 persons. The communities in the study region actively promote themselves as "family beaches" which means there is a strong likelihood that each car contained more than 2 persons.

- Upon what data is the assumption that each car contains only two individuals based?

The peak hour parking demand projections on page E-3 use the 1.8% growth rate for the entire state of NC.

- Why wasn't this calculation based on coastal growth rate projections contained in 15A NCAC 07B .0701?

On Page E-4 the EA states, "...it is important to keep in mind that meeting peak hour capacity does not alleviate the sponsor's obligation to provide parking within one quarter mile of each access site."

- Does the sponsor provide parking within one-quarter mile of each access site?

On Page E-4, the EA states that the percentage of "day-users" in PKS is 3.5% and is significantly lower than the average for beach studies.

- What is the average percentage of "day-users" for Corps beach studies?
- How does the Corps resolve or describe this significant discrepancy?
- Why shouldn't this significant difference affect the validity of the EA?

The Corps, under NOTE on Page E-4, admits that the calculations in the document are inaccurate due to a number of factors including a discrepancy in the estimated peak day, day-visitor beach population in Pine Knoll Shores. According to the Pine Knoll Shores' 1996 Land Use Plan, the town estimated its peak day, day-visitor population to be in excess of 50,000 persons. The EA, however, determined the peak hour, day-visitor beach population demand in PKS to be 50 persons. Even if this hourly demand is multiplied by 24, the peak day, day-visitor beach population in PKS, according to the EA, is 1,200.

- How does the Corps explain the enormous discrepancy in peak day, day-visitor populations between its calculations and the estimates provided by the PKS police department?
- What reason can the Corps provide for not using the peak day, day-visitor population data contained in the Pine Knoll Shores 1996 Land Use Plan?

On page E-5, under Parking Analysis Methodology, the proposed project is compared to a recently completed, locally funded project with no federal public access/parking policies and authorities in which the local communities still have not met pre-project public access promises made to secure state funding.

- How can the Corps compare a federally funded project to a locally funded project with no federal public access/parking policies and authorities?

On page E-5, under Parking Analysis Methodology, the EA states that parking is a component of the recreation analysis.



- Assuming the EA is accurate and significantly fewer people are using the beach on a daily basis, how will this affect future analyses of recreational benefits?

The conditions and stipulations contained under Access and Parking Requirements on Page E-5 are ambiguous and confusing.

According to ER 1165-2-130 and 1105-2-100, adequate parking must be within ¼ mile of each access. On Page E-6, the Corps is allowing parking to be equally distributed within 2-mile stretches. The criteria presented for the selection of two miles is irrelevant. The issue is the geographic distribution of public parking and public access, not the minimum length of a Corps beach nourishment project. The fact remains that the study area does not meet existing federal policies and authorities pertaining to public access and parking.

- What authority does the Corps' Wilmington District have to disregard existing federal policies and authorities regarding the geographic distribution of public access and public parking?

On Page E-6, section 4 B is extremely confusing. The passage reads, in part, "In order to meet the spirit of the regulations to provide public access to those beaches receiving Federal funding for a Section 933 project, it was decided that the sponsor should provide this minimum." From this wording, it appears that the regulations have not been met.

- What does the "spirit" of the regulations mean, how does this differ from actually meeting the regulations?
- If the regulations have not been met, why isn't the Corps enforcing them?

In Section 5 on Page E-6:

- How will the sponsor be held responsible for providing the required number of parking spaces?
- What is the period of analysis of the project?
- What is meant by "on an equal basis?"
- What is meant by "Failure to do so would result in sections of the project reverting to private beach status...?"
- What is the timeframe being discussed?
- What criteria will be used to determine whether a section of the project does not meet "Corps parking criteria" and what parking criteria is being referred to here?

In Item 6 on page E-6:

- What authority does the Corps Wilmington District have to allow public transportation to substitute for adequate public parking as defined in to ER 1165-2-130 and 1105-2-100?
- What enforcement mechanism will be used by the Corps to ensure that a public transportation system is provided year-round?
- What happens if the local sponsor fails to follow through on its commitment?

Under Existing and Proposed Parking and Access Sites on Page E-7:

- What authority does the Wilmington District have to allow public transportation to substitute for adequate public parking as defined in to ER 1165-2-130 and 1105-2-100?

Under Existing and Proposed Parking and Access Sites on Page E-7, the EA states that there is an 82% decrease in demand during the off-peak season.

- How was this figure calculated?

On Page E-8, an exception to existing public access requirements was given to a section of Indian Beach based on "environmental conditions."

- What are the specific environmental conditions that prompted the exception, and what authority does the Wilmington District have to make such an exception?

Submitted by,

Andrew Coburn, Associate Director  
Orrin Pilkey, Director

Program for the Study of Developed Shorelines  
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624 Sugar Lake Road  
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2 June 03

Mr. Hugh Heine  
re: Morehead City 933 Project  
Office of the District Engineer  
U.S. Army Engineer District, Wilmington  
P.O. Box 1890  
Wilmington, NC 28402

Dear Mr. Heine:

I have read the "Draft Evaluation Report and Environmental Assessment, Morehead City Harbor, Section 933, Carteret County, North Carolina, May 2003" and offer the following comments regarding the conclusions drawn with regard to the economic benefits and costs of the project.

In general, it is my professional opinion that the document fails to provide an economically valid or reliable basis for conclusions regarding the benefits of the project, and that therefore the economic conclusions drawn must be regarded as, at best, speculative. This opinion is based upon the following considerations:

1. **Failure to fully assess the in-progress locally-financed project:** if I recall correctly, the project currently underway in this area with local financing was purported to provide 8-10 years of storm protection. If it IS performing as promised, then much of the storm protection claimed for the 933 project is attributable to the existing project, and should not be counted again as benefits for the 933 project. If the current project IS NOT performing as promised by USACE and the local sponsors, then it remains to be shown (1) why that (almost immediate) failure has occurred, and, (2) how/why the design of the 933 project differs in such ways that the failure will not be repeated. Otherwise, the economic analyst has no choice to presume that the 933 project will also fail almost immediately, thereby eliminating most of the claimed future benefits.
2. **Inadequate analysis of severe storm events:** the discussion (and presumably, analysis) of major storm events is limited to categories 1 and 2. This omission is presumably justified by the fact that neither the existing beach nor the augmented beach provide much protection against the larger, more damaging storms, and therefore the augmentation would provide no benefit to analyze. What's missing is the possibility that a Category 4 or 5 storm could destroy many of the structures as well as much of the augmented beach, leaving no protection at all against future

storms of any category, and thereby reducing the benefits of the project to essentially zero, thereafter. [Obviously, this line of reasoning contradicts the notion expressed in the document that short-term storm-damage to beaches quickly re-equilibrates to pre-existing conditions and contours; but if that reasoning is correct, how is it that we're still trying to "correct" damage that occurred in 1996?]

3. **Inappropriate period for analysis:** one searches in vain for any serious, substantive justification for analyzing a 10-year project over a 20-year period. One supposes that it might be argued that simply by delaying until 2015-2024 the damage that otherwise would have occurred during 2005-2014 there is a gain in present value. (That's true, but it's also true that the gain would be small.) If that is the reason for the 20-year observation period, it should be made explicit, and data presented so that the reader may verify that this indeed is what has been done. If there is some other reason for the 20-year observation period, then that should be presented. Otherwise, it must be concluded that the doubling of the observation period is both arbitrary and capricious, and that estimated benefits are therefore too large by a factor of 2.

4. **Inadequate analysis of recreational benefits:** the valuation of recreational benefits is highly speculative, for several reasons: (a) the unit day-value lacked theoretical justification when it was first adopted some 40 years ago, and is now quite hopelessly obsolete; estimates based on this method are presumed to be completely lacking in economic validity; (b) the number of people using the beach can be estimated far more reliably than by aerial photographs; given the simplicity (and low cost) of simply sending an observer to the beach to count the people on the beach at various times on various days, the use of the far-less-direct aerial observance is simply not good science; (c) similarly, the estimates of room occupancy, conjoined with the assumption that every dweller in every room goes to the beach, perhaps contains an upward bias. Taking these deficiencies together, one is forced to conclude that the analysis of recreational benefits (as presented) is seriously biased and unreliable, and should not play any role in evaluating the 933 project. [One also notes that the language in the enabling statute refers explicitly to storm damage, but makes no mention of recreational value. A compelling legal case could be made that recreational value has no legal standing in a 933 analysis.]

5. **Contents value:** the assumption that contents of commercial structures are valued at 50% of the structures' value is another empirical issue that could easily be verified by actual survey of actual commercial structures, rather than relying on local expert opinion. To rely on opinion when data can so easily be gathered is simply not acceptable procedure.

6. **Excess burden of taxation:** although USACE procedures do not require it, sound economic analysis of economic benefits and costs requires consideration of the benefit reductions caused by the behavioral alterations caused by the use of taxation to finance projects. As per OMB suggestion, the analyst should increase cost estimates by about 25% to account for this effect; this adjustment results in a substantial reduction on net benefits.

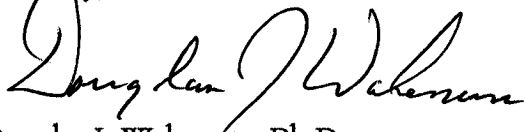
7. **Linear loss of land value:** it is assumed that land's loss of value is linear with the loss of

area (i.e., that every 1% reduction in area produces a 1% loss of value); further, it is asserted that this assumption is "reasonable and non-subjective." It may be indeed be reasonable, but it is absolutely subjective, insofar as many other relationships are both possible and reasonable. For instance, it is also reasonable to believe that small changes in area are largely unnoticed by the market as long as the lot remains (re-)buildable, followed by a very large loss of value for the potentially very small loss of land that takes away the ability to build and/or rebuild. Which is correct? Once again, as we say in economics, that's an empirical question, to be answered not by theory but by statistical reasearch. Otherwise, the choice is wholly subjective, and results based thereupon must be regarded as speculation.

Taking all of these issues into account, it appears that the analysis as presented provides no sound economic basis for a conclusion regard the net economic benefits of the Morehead City 933 project. It is my belief that if all of these issues were fully and appropriately addressed, that the resulting net economic benefits would be far lower than as presented in the document, and quite possibly negative. Sound public policy demands that no action be taken pending correction of these deficiencies.

Thank you for your consideration of these observations.

Cordially,

A handwritten signature in cursive script, reading "Douglas J. Wakeman".

Douglas J. Wakeman, Ph.D.  
Professor of Economics  
School of Business  
Meredith College

*T. B. Doe, III*  
*114 Club Colony Drive*  
*Atlantic Beach, North Carolina, 28512*

*Telephone ☎ 252-726-8952 - Facsimile - 603-710-0574*

**TOM@TOMDOE.COM**

**May 8, 2003**

Department of the Army  
Wilmington District, U. S. Army Corps of Engineers  
Post Office Box 1890  
Wilmington, North Carolina 28402-1890

**Re: CESAW-TS-PE-03-16-002**

**PUBLIC NOTICE  
AND  
NOTICE OF AVAILABILITY  
Environmental Assessment  
Morehead City Harbor Section 933  
Carteret County, North Carolina**

Ladies/Gentlemen:

This is in reference to your above titled May 2, 2003 document. Be advised that page 2, second paragraph, sentence three is in error. The notice specifically states, "...the proposed project is consistent with.....the land use plan for.....Towns of Atlantic Beach....." In fact, the proposed 933 project is in direct violation of the approved 1993 Town of Atlantic Beach Land Use Plan. Specifically, the Atlantic Beach Land Use Plan makes three references to the long standing disposal of Beaufort Inlet and Harbor spoils on Atlantic Beach.

♦ **Page I-71, (i) Excessive Erosion Areas.**

"Numerous spoil projects performed by the U. S. Army Corps of Engineers as a result of dredging projects around the State Port have preserved the Atlantic Beach ocean shoreline. The sand utilized for the spoil was obtained from dredging projects in Beaufort Inlet and Bogue Sound."

♦ **Page IV-6, Ocean Hazard Areas: (b)**

"Atlantic Beach supports the deposit of dredge spoil by the U.S. Army Corps of Engineers on the beach and relocation as the preferred erosion control measures for ocean hazard areas."

♦ **Page IV-7, Ocean Hazard Areas: (e)**

"Atlantic Beach will support the limited adjustment of the CAMA setback line in association with ongoing deposit of sand from dredge spoil projects and the establishment of new permanent dune and vegetation lines. However, it is understood that this policy will not impact permit

decisions regarding CAMA setback line in ocean hazard areas unless the Coastal Resources Commission modifies the State use standards for this AEC."

These three sections of the document clearly tie into the ongoing placement of inner harbor spoils on Atlantic Beach. Transfer of more than 70% of the spoils required to continue this plan, elsewhere, to supply sand for the 933 project, clearly violates Atlantic Beach's Land Use Plan. A 933 plan that builds itself by taking the sand supporting Atlantic Beach's Land Use Plan must be rejected as not "consistent to the maximum extent.....".

Cordially,

A handwritten signature in black ink, appearing to read 'T. B. Doe, III', with a stylized, flowing script.

T. B. Doe, III

cc: Town of Atlantic Beach



**UNITED STATES DEPARTMENT OF COMMERCE**  
**National Oceanic and Atmospheric Administration**  
NATIONAL MARINE FISHERIES SERVICE

Southeast Regional Office  
9721 Executive Center Drive North  
St. Petersburg, Florida 33702

July 16, 2003

Colonel Charles R. Alexander, Jr.  
District Engineer, Wilmington District  
Department of the Army, Corps of Engineers  
Regulatory Division  
P. O. Box 1890  
Wilmington, North Carolina 28402-1890

Attention: Coleman Long

Dear Colonel Alexander:

The National Marine Fisheries Services (NOAA Fisheries) has reviewed the modified Draft Environmental Assessment/ Finding of No Significant Impact (EA/FONSI) and Final Evaluation Report (FER) for the Morehead City, Section 933 Project, located on Bogue Banks in Carteret County, North Carolina. The documents were provided by your staff via electronic mail on July 10, 2003.

The May 2, 2003, public notice for this project initiated consultation pursuant to the Essential Fish Habitat (EFH) provisions of the Magnuson-Stevens Fisheries Coordination and Management Act and, by letter dated June 5, 2003, NOAA Fisheries provided its EFH Conservation Recommendations. We also participated in a June 24, 2003, interagency meeting to discuss the project and your staff responded to our EFH Conservation Recommendations by letter dated June 27, 2003. While the June 27<sup>th</sup> letter did not fully alleviate our concerns regarding certain aspects of the project, further coordination between our agencies resulted in changes that are desirable and largely address our concerns. In connection with this, NOAA Fisheries has reviewed the revised EA/FONSI and FER as they relate to our EFH Conservation Recommendations and we provide the following comments:

EFH Conservation Recommendation No. 1 Additional information provided at the most recent interagency meeting and included in the modified EA/FONSI adequately addresses our concerns regarding full assessment of "without project conditions." Since the completed Bogue Banks Beach Nourishment Project (BBBNP), Phases I and II, failed to provide the approved volume of fill, the Section 933 project would supplement erosion control on portions of Bogue Banks while a long-term solution is being investigated by the Wilmington District. NOAA Fisheries remains concerned over





repetitive beach nourishment that precludes recovery of aquatic species and we continue to recommend that this issue be examined in detail in association with the Corps' long-term study of beach nourishment needs on Bogue Banks.

EFH Conservation Recommendation No. 2 The project construction time frame has been reduced from 16 months of continuous dredging to the period of November 1, 2003, through April 30, 2004, which is acceptable to NOAA Fisheries. We also do not object to extension of this period to May 31, 2004, if necessary to complete the project. However, agreement to extension of the work period is based on an absolute commitment by the Wilmington District to terminate all dredging, disposal of dredged material, and reworking of dredged material with heavy equipment on May 31, 2003.

EFH Conservation Recommendation No. 3 To ensure compatibility of dredged material with that found on Bogue Banks beaches, NOAA Fisheries recommended analysis of sediment grain size on Brandt Island and in the Morehead City inner harbor. The sediment analysis, which is contained in the FER, Section 505, Table 1, indicates the sediments in the Morehead City inner harbor are compatible with those found on Bogue Banks beaches. We remain concerned that a silt layer was detected at the Brandt Island borrow site; however, according to the FER, fine sediment comprises only two percent of the total volume of material to be removed from Brandt Island and placed on beaches at Pine Knoll Shores, Indian Beach, and Salter Path. Also, the project plans include a requirement for Corps inspectors to monitor all dredging and, if incompatible sediments are encountered, the dredge will be immediately relocated to an area with compatible sediments. These modifications adequately address and resolve our concerns and previous recommendation.

EFH Conservation Recommendation No. 4 NOAA Fisheries seeks to ensure that populations of mole crab (*Emerita talpoida*) and coquina clam (*Donax variabilis*) are provided sufficient time to repopulate nourished sections of beach before additional re-nourishment commences. The modified dredging schedule calls for completion of biological sampling to evaluate species recovery in connection with the BBBNP; however, monitoring performed thus far has not demonstrated that recovery by mole crab and coquina clam is occurring. This may be due to placement of incompatible material on sections of beach during the BBBNP. If, the Section 933 project results in burial of areas that are undergoing slow recovery and compatible sediments are used, then population recovery may be expedited. Based on this, NOAA Fisheries withdraws the previously recommended three year lapse in beach disposal to allow for mole crab and coquina clam recovery. However, if final monitoring of beaches at Pine Knoll Shores does not demonstrate adequate recovery of mole crabs and coquina clams, then the Wilmington District should monitor these areas to determine when pre-project population levels are, in fact, attained.

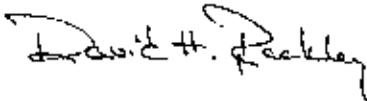
EFH Conservation Recommendation No. 5 The Wilmington District has provided assurance that sediments to be placed on Bogue Banks are compatible with the exiting beach sand. However, we remain concerned that should non-compatible sediments be placed on Bogue Banks, there are no contingency plans for beach restoration. Therefore, NOAA Fisheries continues to recommend that the Corps develop a feasibility plan for beach restoration in the event that incompatible material is placed on the beach.

EFH Conservation Recommendation No. 6 Based our review of the modified EA/FONSI and FER, NOAA Fisheries finds that individual and cumulative adverse impacts to fishery resource have been minimized. Therefore, we agree that the EA/FONSI is adequate and preparation of a full EIS is not warranted.

In view of the preceding, we do not object to undertaking the project, provided the above recommendations, and the modifications proposed by the Wilmington District, are effectuated.

Thank you for the opportunity to provide these additional comments. Related questions or comments should be directed to the attention of Mr. Ronald S. Sechler at our Beaufort Office, 101 Pivers Island Road, Beaufort, North Carolina, or at (252) 728-5090.

Sincerely,

  
for Frederick C. Sutter III  
Deputy Regional Administrator

cc:

USFWS Raleigh, NC  
USEPA Athens, GA  
NCWRC, Raleigh NC  
NCDMF, Morehead City NC  
SAFMC, Charleston NC



North Carolina Department of Environment and Natural Resources  
Division of Coastal Management

Michael F. Easley, Governor

Donna D. Motlitt, Director

William G. Ross Jr., Secretary

July 18, 2003

Mr. W. Coleman Long  
Chief - Planning and Environmental Branch  
U.S. Army Corps of Engineer - Wilmington District  
Post Office Box 1890  
Wilmington, North Carolina 28402-1890

REFERENCE: DCM03-06 Environmental Assessment, Morehead City Harbor  
Section 933, Carteret County, North Carolina - U. S. Army Corps of  
Engineers Public Notice Issued on May 2, 2003  
And  
Draft Final Evaluation Report and Finding of No Significant Impact  
(FONSI) - Morehead City Harbor Section 933

Dear Mr. Long:

The State of North Carolina has completed its review pursuant to 15 CFR 930 Subpart C - Consistency for Federal Activities of the above referenced Public Notice and the Draft Final Evaluation Report - FONSI. As part of its review, the N.C. Division of Coastal Management (DCM) has circulated the U.S. Army Corps of Engineers (USACE) public notice to state agency reviewers for comment.

The USACE public notice issued on May 2, 2003 states that the Wilmington District of the USACE is proposing to place beach quality material from the pumpout of the Brandt Island spoil disposal site and the maintenance dredging of Morehead City Harbor navigation channels onto Bogue Banks beaches, off the Atlantic Ocean. The Bogue Banks beaches include Atlantic Beach, Pine Knoll Shores, Indian Beach (including Salter Path), and Fort Macon State Park. The proposed project is being undertaken under the authority of Section 933 of the Water Resources Development act of 1986 (Public law 99-662), as amended. The Draft Final Evaluation Report and FONSI reflect modifications to the initial proposal to address concerns raised in the June 24, 2003 interagency meeting held to discuss this proposal.

1638 Mail Service Center, Raleigh, North Carolina 27699-1638  
Phone: 919-733-2293 \ FAX: 919-733-1495 \ Internet: [www.nccoastalmanagement.net](http://www.nccoastalmanagement.net)

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Based upon our review, we agree with your determination that the proposed activity is consistent with the North Carolina Coastal Management Program to the maximum extent practicable provided the following conditions are satisfied:

1. The North Carolina Wildlife Resources Commission has expressed concerns about the potential impacts of repeated nourishment projects on the Bogue Banks beaches, and the cumulative impacts to macroinvertebrate populations and the shorebirds that prey on them. The USACE should continue to evaluate measures to help mitigate any unavoidable effects of the project on waterbirds and shorebirds, as discussed at the June 24, 2003 meeting.
2. The North Carolina Division of Marine Fisheries (DMF) has also expressed concerns about the cumulative impacts to important commercial fish stocks and birds of repeated beach nourishment events over relatively short time intervals. DMF recommends that monitoring associated with the Bogue Banks Beach Nourishment Project (BBBNP) be reviewed and, if it does not demonstrate recovery of beach invertebrates, the USACE should coordinate with the BBBNP project sponsors to ensure that monitoring continues until recovery is attained.
3. The North Carolina Division of Coastal Management (DCM) has expressed concern related to the presence of a silt layer on Brandt Island. DCM recommends that the questionable material not be pumped along the public beach areas of Fort Macon and the circle of Atlantic Beach.
4. DCM is concerned about the access channel that would be cut into Brandt Island and its potential to cause erosion of the dike walls (over time) and the impacts associated with such problems. The USACE should restore that portion of the channel adjacent to the island back to its original condition to alleviate any potential erosion problems.
5. The North Carolina Division of Environmental Health - Shellfish and Recreational Water Quality Section has expressed concerns about the potential human health hazard associated with the placement of dredged material obtained from areas closed to shellfishing on the beaches between May 1 and October 31 when recreational usage is high. Therefore, the USACE must notify the Shellfish Sanitation and Recreational Water Quality Section prior to dredging from an area closed to shellfishing with placement on a recreational swimming area so that a public release can be made and a swimming advisory can be posted.

If you have any questions, please contact Guy C. Pearce by phone at (919) 733-2293, extension 249. Thank you for your consideration of the North Carolina Coastal Management Program.

Sincerely,



Doug Huggen  
Major Permits and Consistency Coordinator

cc:



## United States Department of the Interior

### FISH AND WILDLIFE SERVICE

Raleigh Field Office  
Post Office Box 33726  
Raleigh, North Carolina 27636-3726

July 22, 2003

Colonel Charles R. Alexander, Jr.  
District Engineer, Wilmington District  
U.S. Army Corps of Engineers  
Post Office Box 1890  
Wilmington, North Carolina 28402-1890

Attn: Coleman Long

Dear Colonel Alexander:

This letter constitutes a second amendment to the U.S. Fish and Wildlife Service's (Service) biological opinion, dated December 7, 1989, as amended April 19, 1993, for the U.S. Army Corps of Engineers' (Corps) proposed dredging of Morehead City Harbor and subsequent disposal of dredged sediments in a Morehead City Ocean Dredged Material Disposal Site, an upland diked dredge disposal area on Brandt Island, or pumped directly to the ocean front beaches at Fort Macon State Park to Atlantic Beach, in Carteret County, North Carolina. The Service received a written request from the Corps on May 5, 2003, to initiate formal section 7 consultation under the Endangered Species Act of 1973, as amended (16 U.S.C. § 1531 et seq.) (Act) based on changes in the proposed project's scope of work and timing.

The Service prepared a biological opinion, dated December 7, 1989, for the proposed dredging of Morehead City Harbor with subsequent disposal of dredged sediments in a Morehead City Ocean Dredged Material Disposal Site, an upland diked dredge disposal area on Brandt Island, or pumped directly onto the oceanfront beach at Fort Macon State Park and Atlantic Beach. In our biological opinion we concurred with your findings that the proposed action would have no effect on the piping plover (*Charadrius melodus*), roseate tern (*Sterna dougallii*), and hawksbill (*Eretmochelys imbricata*) and Kemp's ridley (*Lepidochelys kempii*) sea turtles, and that the proposed action may affect loggerhead (*Caretta caretta*) and green (*Chelonia mydas*) sea turtles. Our biological opinion concluded that the proposed action was not likely to jeopardize the continued existence of loggerhead and green sea turtles.

An amendment to the biological opinion, dated April 19, 1993, was prepared in response to updated project plans of the original dredge and disposal action. The project modifications included the disposal of additional dredged sediment material on oceanfront beaches from Fort Macon State Park to Pine Knoll Shores and a different pipeline route than reviewed in the original project. The amended biological opinion concluded that the proposed project modifications were not likely to jeopardize the continued existence of loggerhead and green sea

turtles. The amended biological opinion also included a conference opinion for the proposed federally-threatened seabeach amaranth (*Amaranthus pumilus*) in which we concluded that the proposed action would not likely jeopardize the continued existence of this species. Seabeach amaranth was formally listed as threatened on May 7, 1993 (58 FR 18035).

The proposed action, as detailed in your Draft Evaluation Report and Environmental Assessment (DER/EA), dated May 2003, consists of placing approximately 6.3 million cubic yards of dredged material stored in the Brandt Island disposal site and sediments from maintenance dredging of the inner and outer harbor navigation channels of Morehead City and Beaufort Inlet along approximately 13.2 linear miles of oceanfront beaches of Bogue Banks (including Fort Macon, Atlantic Beach, Pine Knoll Shores, Salter Path, and Indian Beach), Carteret County, North Carolina (hereafter referred to as Morehead City Harbor Section 933 Project). The proposed action is a modification to the previously reviewed project in that it includes the disposal of dredged sediments on the beaches of Salter Path and Indian Beach. The proposed project is a one-time action to dispose of sediments beginning November 16, 2003 and continue for up to 16 months (estimated completion date April 30, 2005). However, the pump-out of Brandt Island and disposal of these sediments on the oceanfront beaches of Bogue Banks is expected to occur, as it has in the past, every 8 to 10 years. The proposed action is scheduled to operate 24 hours a day, seven days a week for the duration of the project.

In your Draft Final Evaluation Report and Finding Of No Significant Impact (DFER/FONSI), dated July 2003, for the Morehead City Harbor Section 933 Project, the proposed action was modified to reduce the period of time that sediments will be deposited on the area beaches from 16 months to approximately six months. The proposed action still consists of pumping approximately 6.3 million cubic yards of material on the 13.2 linear miles of oceanfront beaches of Bogue Banks, but the time period sediment disposal will occur will be limited from November 1, 2003 to April 30, 2004 (extended to May 31, 2004 if the contractor experiences mechanical problems). These dates do not include pre- and post-project mobilization or the placement and removal of equipment, which requires an additional two to three weeks on each end of the proposed construction dates specified above.

In response to your DER/EA, dated May 2003, for the proposed Morehead City Harbor Section 933 Project, we concluded in a letter, dated June 6, 2003, that the proposed action is not likely to adversely affect the roseate tern and hawksbill, Kemp's ridley, and leatherback (*Dermochelys coriacea*) sea turtles. With regard to the West Indian manatee (*Trichechus manatus*), however, we could not concur with your determination that the proposed action is not likely to adversely affect this species unless the measures detailed in the *Precautionary Measures For Activities In North Carolina Waters Which May Be Used By The West Indian Manatee* were implemented.

In your DFER/FONSI, dated July 2003, you stated that the Corps would abide by the conditions and restrictions found within the *Precautionary Measures For Activities In North Carolina Waters Which May Be Used By The West Indian Manatee* document submitted to you along with our June 6, 2003 letter. Based on your commitment to include these measures, we conclude that the proposed action is not likely to adversely affect the West Indian manatee. To further reduce the potential impacts of the proposed project on federally-protected species, the Corps has also

offered a list of environmental commitments in Section 9.0 of the DFER/FONSI. These commitments are incorporated by reference and were considered as conservation measures in our review of the proposed project. The Service considers conservation measures part of the proposed action; therefore, their implementation is required under the terms of the consultation.

Because the proposed Morehead City Harbor Section 933 Project is different in timing and scope from the project reviewed in the original biological opinion and amendment, and new information is available on seabeach amaranth, the piping plover, and green and loggerhead sea turtles, we initiated formal consultation in a letter, dated June 6, 2003, for these species.

Based on information provided in your DFER/FONSI and a change in the timing of the proposed action, and other information available, we have determined that the proposed project is not likely to adversely affect the piping plover. The piping plover has not been reported to nest in the vicinity of the proposed dredging, on Brandt Island, in the areas of dredge pipe placement, or sediment disposal; therefore, none would likely be affected. A single piping plover was recorded in the vicinity of the proposed action in Fort Macon State Park on January 18, 1996; although, it should be noted that all areas impacted by the proposed action have not been extensively surveyed during the migration and overwintering periods.

The remaining portions of this amendment are based on information provided in the DER/EA, DFER/FONSI, supplemental information, and other sources of information available. The status of seabeach amaranth and green and loggerhead sea turtles, including species descriptions, life histories, population dynamics, and an analysis of the habitats likely affected have been reviewed in the biological opinion for this project, dated December 7, 1989, as amended April 19, 1993. A complete administrative record of this consultation is on file in the Ecological Services Field Office in Raleigh, North Carolina.

#### INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered or threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are non-discretionary, and must be undertaken by the Corps so

that they become binding conditions of any grant or permit issued, as appropriate, for the exemption in section 7(o)(2) to apply. The Corps has a continuing duty to regulate the activity covered by this incidental take statement. If the Corps (1) fails to assume and implement the terms and conditions or (2) fails to require a contractor to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Corps must report the progress of the action and its impacts on the species to the Service as specified in the incidental take statement (50 CFR § 402.14(i)(3)).

#### AMOUNT OR EXTENT OF INCIDENTAL TAKE

**Seabeach Amaranth** – Sections 7(b)(4) and 7(o)(2) of the Act generally do not apply to listed plant species. However, limited protection of listed plants from take is provided to the extent that the Act prohibits the removal and reduction to possession of federally-listed endangered plants or the malicious damage of such plants on areas under federal jurisdiction, or the destruction of endangered plants on non-federal areas in violation of state law or regulation or in the course of any violation of a State criminal trespass law. Applicable provisions of the North Carolina Plant Protection and Conservation Act (GS 106-202.12 to 202.22) should be followed.

**Sea Turtles** – The Service anticipates approximately 13.2 linear miles of nesting beach habitat on the beaches of Bogue Banks from Fort Macon State Park to Indian Beach (including Salter Path) could be taken as a result of this proposed action. Based on the review of biological information and other information relevant to this action, incidental take is anticipated to be in the form of: (1) destruction of all sea turtle nests that may be constructed and eggs that may be deposited and missed by a nest survey and egg relocation program within the boundaries of the proposed project; (2) destruction of all sea turtle nests deposited when a nest survey and egg relocation program is not required to be in place within the boundaries of the proposed project; (3) reduced hatching success due to egg mortality during relocation and adverse conditions at the relocation site; (4) harassment in the form of disturbing or interfering with female turtles attempting to nest within the nourishment area or on adjacent beaches as a result of nourishment activities; (5) disorientation of hatchling turtles on beaches adjacent to the nourishment area as they emerge from the nest and crawl to the water as a result of project lighting; (6) behavior modification of nesting females due to escarpment formation within the project area during a nesting season, resulting in false crawls or situations where they choose marginal or unsuitable nesting areas to deposit eggs; and, (7) destruction of all nests destroyed as a result of escarpment leveling within a nesting season when such leveling has been approved by the Service.

Incidental take is anticipated for only the 13.2 linear miles of nesting beach habitat on the beaches of Bogue Banks from Fort Macon State Park to Indian Beach (including Salter Path) that have been identified for sediment disposal. The Service anticipates incidental take of sea turtles will be difficult to detect for the following reasons: (1) turtles nest primarily at night and all nests are not found because (a) natural factors, such as rainfall, wind, and tides may obscure crawls, and (b) human-caused factors, such as pedestrian traffic, may obscure crawls, and result in nests being destroyed because they were missed during a nesting survey and egg relocation program; (2) the total number of hatchlings per undiscovered nest is unknown; (3) the reduction in percent



hatching and emerging success per relocated nest over the natural nest site is unknown; (4) an unknown number of females may avoid the project beaches and be forced to nest in a less than optimal area; (5) lights may disorient an unknown number of hatchlings and cause death; and, (6) escarpments may form and cause an unknown number of females from accessing a suitable nesting site. However, the level of take of these species can be anticipated by the disturbance of suitable turtle nesting beach habitat because: (1) turtles nest within the project site; (2) sediment disposal will likely occur during a portion of the nesting season; (3) the sediment disposal project will modify the incubation substrate, beach slope, and sand compaction; and, (4) artificial lighting will disorient nesting females and hatchlings.

#### EFFECT OF THE TAKE

In the accompanying biological opinion amendment, the Service determined that this level of anticipated take is not likely to result in jeopardy to seabeach amaranth or loggerhead and green sea turtles.

#### REASONABLE AND PRUDENT MEASURES

The Service believes that the following reasonable and prudent measures are necessary and appropriate to minimize take of seabeach amaranth and loggerhead and green sea turtles:

- (1) Only high-quality, beach-compatible sand should be deposited on the beaches of Bogue Banks as part of this project;
- (2) If the construction phase is conducted during the seabeach amaranth growing season (May 1 through October 31), surveys for seabeach amaranth will be conducted prior to the start of any sediment disposal and again prior to any tilling operation. If plants are found within the area of sediment disposal or tilling, the plants shall be protected with an adequate buffer zone;
- (3) The Corps will ensure that contractors doing the work fully understand the seabeach amaranth protection measures detailed in this opinion;
- (4) Patrols for nesting turtles will be required if the project is conducted during the sea turtle nesting season (May 1 through November 15). If nests are constructed in the area of sediment disposal, the eggs will be relocated following the protocols of a nest relocation program approved by the North Carolina Wildlife Resources Commission and the Service;
- (5) Immediately after completion of the project and prior to the next three sea turtle nesting seasons, beach compaction will be monitored and tilling will be conducted as required to reduce the likelihood of impacting sea turtle nesting and hatching activities;
- (6) Immediately after completion of the project and prior to the next three sea turtle nesting seasons, monitoring will be conducted to determine if escarpments are present, and

escarpments will be leveled as required to reduce the likelihood of impacting sea turtle nesting and hatching activities;

- (7) During the sea turtle nesting season (May 1 through November 15), lighting associated with the project will be minimized to reduce the possibility of disrupting and disorienting nesting and/or hatchling sea turtles;
- (8) During the sea turtle nesting season (May 1 through November 15), construction equipment and pipes will be stored in a manner that will minimize impacts to sea turtles to the maximum extent practicable; and,
- (9) The Corps will ensure that contractors doing the work fully understand the sea turtle protection measures detailed in this amendment.

#### **TERMS AND CONDITIONS**

In order to be exempt from the prohibitions of section 9 of the Act, the Corps must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

##### **Terms and Conditions: All Species**

A report describing the actions taken to implement the terms and conditions of this incidental take statement will be submitted to the Service's Raleigh Field Office, Post Office Box 33726, Raleigh, North Carolina 27636-3726 within 60 days of completion of the proposed work. This report will include the status of the species -- seabeach amaranth and nesting loggerhead and green sea turtles -- addressed in this opinion amendment and any known impacts, either beneficial or adverse, of the project upon completion of the construction phase and following each maintenance phase, inclusive of the years between each operational event. The dates of actual construction activities and the names and qualifications of personnel involved in species surveys should also be included.

##### **Terms and Conditions: Seabeach Amaranth**

Seabeach amaranth surveys will be required if any portion of the sediment disposal project or tilling operation occurs during the period May 1 through October 31. Plant surveys will be initiated prior to sediment disposal, dredge pipe placement or removal, and/or tilling activities. If plants are discovered in areas where they may be affected by sediment disposal, dredge pipe placement or removal, and/or tilling activities, the plants will be protected by an adequate buffer zone. The protected area will not identify the plants to protect them from collectors, but will be of adequate size to obscure the specific plant site.

##### **Terms and Conditions: Sea Turtles**

1. All fill material placed on beaches will be sand that is similar to that of the native beach in both coloration and grain size distribution. All such fill material will be free of construction debris, rocks, organic materials, or other foreign matter and will not contain, on average, greater than 10 percent fines (i.e., silt and clay; passing the # 200 sieve) and will not contain, on average, greater than 5 percent coarse gravel or cobble, exclusive of shell material (retained by the # 4 sieve).
2. Daily early morning nesting surveys will begin when mobilization and construction begins and continue through November 15. Nightly (from dark till dawn) sea turtle nesting patrols will be required if any portion of the sediment disposal project continues after May 1. Nightly nesting patrols will be initiated on May 1 and continue throughout the construction and demobilization periods. Daily early morning nesting surveys will commence again upon completion of the disposal project and demobilization and continue through November 15. If vehicles are used for nest monitoring, the vehicles should stay below the high tide line, whenever possible, and use modified headlamps (e.g., red headlamps) or the minimal lighting necessary to comply with safety requirements. If nests are constructed in areas where they may be affected by construction disposal activities, eggs will be relocated per the following requirements.
  - 2a. Nesting surveys and egg relocations will only be conducted by personnel with prior experience and training in nest survey and egg relocation procedures. Surveyors must have a valid North Carolina Wildlife Resources Commission permit.
  - 2b. Only those nests that may be affected by construction activities will be relocated. Nests and eggs that require relocation will be moved no later than 9 a.m. the morning following deposition to a nearby self-release beach site in a secure setting where artificial lighting will not interfere with hatchling orientation. Nest relocations in association with construction activities will cease when construction activities no longer threaten nests. Nests deposited within the areas where construction activities have ceased or will not occur for 65 days will be marked and left in place unless other factors threaten the success of the nest. Any nests left in the active construction zones will be clearly marked, and all mechanical equipment will avoid nests by at least 20 feet. The nest site will also be cleared of materials or equipment that could potentially block passage of hatchlings from leaving the nest and approaching the ocean.
3. Immediately after completion of sediment placement on beaches and prior to May 1 for three subsequent years, sand compaction will be monitored in the placement area in accordance with a protocol agreed to by the Service, the North Carolina Wildlife Resources Commission, and the Corps. At a minimum, the protocol provided under 3a and 3b below will be followed. If required, the area will be tilled to a depth of 36 inches. All tilling activity must be completed prior to May 1. If the project is completed during the nesting season, tilling will not be performed unless specifically authorized by the Service under a separate letter. A report on the results of compaction monitoring will be

submitted to the Service prior to any tilling actions being taken. An annual summary of compaction surveys and the actions taken will be submitted to the Service. This condition will be evaluated annually and may be modified if necessary to address sand compaction problems identified during the previous year. Please note that the requirement for compaction monitoring and remediation is not required if placed material no longer remains on the beach.

- 3a. Transects consisting of two compaction sampling stations will be located at 500 foot intervals along the sediment disposal area. One station will be at the seaward edge of the dune line (when material is placed in this area); and one station will be midway between the dune line and the high water line (normal wrack line). Two additional transects are recommended on each side of the sediment disposal area so that comparisons can be made between effected and unaffected areas.

At each station, the cone penetrometer will be pushed to a depth of 6, 12, and 18 inches three times (three replicates). Material may be removed from the hole if necessary to ensure accurate readings of successive levels of sediment. The penetrometer may need to be reset between pushes, especially if sediment layering exists. Layers of highly compact material may lay over less compact layers. Replicates will be located as close to each other as possible, without interacting with the previous hole and/or disturbed sediments. The three replicate compaction values for each depth will be averaged to produce final values for each depth at each station. Reports will include all 18 values for each transect line, and the final six averaged compaction values.

- 3b. If the average value for any depth exceeds 500 psi for any two or more adjacent stations, or if values exceeding 500 psi are distributed throughout the sediment placement areas but in no case do those values exist at two adjacent stations at the same depth, then consultation with the Service will be required to determine if tilling is required. If a few values exceeding 500 psi are present randomly within the placement area, then tilling will not be required.
4. Sand compaction data will be collected on beaches scheduled for sediment disposal prior to the disposal operation following the protocols described above. Such pre-disposal beach compaction data will establish a range of values for areas in which sea turtles actually nest. These data will form a valuable baseline for comparison with post-disposal compaction values and could influence the necessity for post-disposal tilling.
5. Visual surveys for escarpments along the project area will be made immediately after completion of the sediment placement and prior to May 1 for three subsequent years. Results of the surveys will be submitted to the Service prior to any action being taken. Escarpments that interfere with sea turtle nesting or that exceed 18 inches in height for a distance of 100 feet will be leveled to the natural beach contour by May 1. The Service will be contacted immediately if subsequent reformation of escarpments that interfere with sea turtle nesting or that exceed 18 inches in height for a distance of 100 feet occur

during the nesting and hatching season to determine the appropriate action to be taken. If it is determined that escarpment leveling is required during the nesting or hatching season, the Service will provide a brief written authorization that describes methods to be used to reduce the likelihood of impacting existing nests. An annual summary of escarpment surveys and actions taken will be submitted to the Service. Please note that the requirement for escarpment monitoring and remediation is not required if placed material no longer remains on the beach.

6. The Corps will arrange a meeting between representatives of the contractor, the Service, the Commission, and the permitted person responsible for egg relocation at least 30 days prior to the commencement of work on this project. At least 10-days advanced notice will be provided prior to conducting this meeting. This will provide an opportunity for explanation and/or clarification of the sea turtle protection measures.
7. From May 1 through November 15, staging areas for construction equipment will be located off the beach to the maximum extent practicable. Nighttime storage of construction equipment not in use will be off the beach to minimize disturbance to sea turtle nesting and hatching activities. In addition, all construction pipes that are placed on the beach will be located as far landward as possible without compromising the integrity of the existing or reconstructed dune system. Temporary storage of pipes will be off the beach to the maximum extent possible. Temporary storage of pipes on the beach will be in such a manner so as to impact the least amount of nesting habitat and will likewise not compromise the integrity of the dune systems (placement of pipes perpendicular to the shoreline is recommended as the method of storage).
8. From May 1 through November 15, all lighting associated with the project will be limited to the immediate area of active construction only and will be the minimal lighting necessary to comply with safety requirements. Shielded lights are recommended to minimize illumination of the nesting beach and nearshore waters. Lighting on offshore equipment will be minimized through reduction, shielding, lowering, and appropriate placement of lights to avoid excessive illumination of the water, while meeting all U.S. Coast Guard and Occupational Safety and Health Administration requirements. Shielded lights are highly recommended for lights on offshore equipment that cannot be eliminated.
9. A report describing the actions taken to implement the terms and conditions of this incidental take statement will be submitted to Mr. David Rabon of the Service's Raleigh Field Office within 60 days of completion of the proposed work. This report will include the dates of actual construction activities, names and qualifications of personnel involved in nest surveys and relocation activities, descriptions and locations of self-release beach sites, nest survey and relocation results, and hatching success of nests.
10. In the event a sea turtle nest is excavated during construction activities, the permitted person responsible for egg relocation for the project should be notified so the eggs can be moved to a suitable relocation site.

11. Upon locating a dead, injured, or a sick sea turtle specimen, initial notification must be made to Dr. Matthew Godfrey, Sea Turtle Coordinator, North Carolina Wildlife Resources Commission, at 252-728-1528 (or emergency pager 252-247-8117) prior to transporting live debilitated turtles to a rehabilitation facility or disposing of carcasses. Care will be taken in handling sick or injured specimens to ensure effective treatment and care and in handling dead specimens to preserve biological materials in the best possible state for later analysis of cause of death. In conjunction with the care of a sick or injured sea turtle or preservation of biological materials from a dead animal, the finder has the responsibility to ensure that evidence intrinsic to the specimen is not disturbed.

The Service believes that incidental take of sea turtles will be limited to the 13.2 linear miles of nesting beach habitat on Bogue Banks that has been identified for sand placement. The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. The Service believes that no more than the following types of incidental take will result from the proposed action: (1) destruction of all sea turtle nests that may be constructed and eggs that may be deposited and missed by a nest survey and egg relocation program within the boundaries of the proposed project; (2) destruction of all sea turtle nests deposited during the period when a nest survey and egg relocation program is not required to be in place within the boundaries of the proposed project; (3) reduced hatching success due to egg mortality during relocation and adverse conditions at the relocation site; (4) harassment in the form of disturbing or interfering with female turtles attempting to nest within the construction area or on adjacent beaches as a result of construction activities; (5) disorientation of hatchling turtles on beaches adjacent to the construction area as they emerge from the nest and crawl to the water as a result of project lighting; (6) behavior modification of nesting females due to escarpment formation within the project area during a nesting season, resulting in false crawls or situations where they choose marginal or unsuitable nesting areas to deposit eggs; and, (7) destruction of all nests destroyed as a result of escarpment leveling within a nesting season when such leveling has been approved by the Service. The amount or extent of incidental take for sea turtles will be considered exceeded if the project results in sediment disposal occurring more than once or on more than the 13.2 linear miles of beach shoreline identified for sand placement in the Morehead City Harbor Section 933 Project without reinitiation of consultation and/or the prior written consent of the Service. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The federal action agency must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

#### CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Endangered Species Act directs federal action agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or

critical habitat, to help implement recovery plans, or to develop information. The Service encourages the Corps to implement the following conservation recommendations as part of the project plans.

- (1) Although the Service has determined that the subject action is not likely to jeopardize the continued existence of the loggerhead and green sea turtles and seabeach amaranth, from the Service's viewpoint, summer work on beaches with seabeach amaranth and sea turtle nesting is completely undesirable. Although this biological opinion amendment allows the Corps of Engineers to conduct beach disposal activities during the beginning and ending parts of the sea turtle nesting and hatching seasons in accordance with both section 7 and 9 of the Act, the Service recommends that the Corps avoid the sea turtle nesting and hatching seasons when conducting future beach disposal activities.
- (2) Provide additional funding for a nest and sand temperature and sand compaction study. The Corps has contributed to the North Carolina Wildlife Resources Commission and the Service's project already underway on Bogue Banks. Additional funding will allow the purchase of extra equipment and supplies to ensure that the joint agency study can continue in its entirety (6 years) on all the beaches of Bogue Banks. The information gained from this study would be beneficial in determining the impacts of sediments on sea turtle nesting success, hatchling sex ratios, and hatching success. Furthermore, the information would be useful in determining if remedial action is necessary and in assessing whether the impacts of the proposed action would have long-term effects on the beaches' ecosystem. Please note that components of this study also satisfy conditions related to sand compaction and escarpment monitoring.
- (3) Survey for breeding piping plovers within the project area, specifically in the area of pipe placement along Fort Macon State Park, prior to the removal of any construction equipment between April 1 and July 31. If nesting piping plovers are found, then please report the findings to the Service and the North Carolina Wildlife Resources Commission prior to the removal of any dredge pipe or other construction equipment so that measures can be taken to protect the nests. The Service and the Commission will establish protective markings or symbolic fencing around the nests, protective buffer zones, and work restrictions within the protective buffer zones. The Corps can then proceed with the removal of any construction equipment or dredge pipe and the assurance that those activities will not disturb the protected areas or the nesting piping plovers.
- (4) For this project as well as future projects, require the non-federal project partner(s), as part of the contractual agreement between the non-federal project partner(s) and the Corps, to develop and implement a habitat conservation and lighting management plan to protect federally-protected coastal species (e.g., sea turtles, piping plover, seabeach amaranth) within the boundaries of their jurisdiction (i.e., municipality, county, or other area of jurisdiction). The Service and the North Carolina Wildlife Resources Commission are available and willing to assist the non-federal project partner in the development of such a plan.

- (5) Modify and create new habitat for the *Atrytonopsis* skipper on Brandt Island and other Corps defined disposal facilities in the Bogue Banks area. Modification and creation of habitats can include mowing or vegetation removal to promote the occurrence of the species' host plant, seaside little bluestem (*Schizachyrium littorale*), and/or planting or sprigging seaside little bluestem along dike walls or other areas suitable for this species.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

This concludes consultation on the action outlined in your request for formal consultation for the Morehead City Harbor Section 933 Project. As provided in 50 CFR § 402.16, reinitiation of formal consultation is required where discretionary federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in the opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in the opinion; or, (4) a new species is listed or critical habitat designated that may be affected by the action.

Thank you for your cooperation with our agency in protecting federally-listed species. If you or your staff have any questions concerning this amendment, please contact Mr. David Rabon of this office at (919) 856.4520 extension 16, or via email at david\_rabon@fws.gov.

Sincerely,

/signed/

Garland B. Pardue, Ph.D.  
Ecological Services Supervisor

cc: NCWRC, Beaufort, NC (Matthew Godfrey)  
NCWRC, Stella, NC (Sue Cameron)



**MOREHEAD CITY HARBOR  
CARTERET COUNTY, NORTH CAROLINA  
SECTION 933  
EVALUATION REPORT**

**APPENDIX A  
CORRESPONDENCE**



## **Appendix A**

### **Pertinent Correspondence**

NOTE: This appendix includes general correspondence concerning the project.

#### **Table of Contents**

Letter dated 22 February 2001 from North Carolina Department of Environment and Natural Resources Requesting a Section 933 Study at Morehead City Harbor (Exhibit 1)	A-1
Letter dated 22 January 2001 from Carteret County with Resolution Requesting that the State Request a Section 933 Project to place Beaufort Inlet (MCH) Dredging on Bogue Banks(Exhibit 2)	A-2
Letter dated 6 January 2003 from Carteret County confirming their intent to Execute a PCA with the Corps (Exhibit 3)	A-3



## EXHIBIT 1

North Carolina  
Department of Environment and Natural Resources  
Division of Water Resources

Michael F. Easley, Governor  
William G. Ross, Jr., Secretary  
John Morris, Director



February 22, 2001

Mr. Steve F. Aiken  
US Army Corps of Engineers  
Wilmington District  
PO Box 1890  
Wilmington, NC 28402-1890

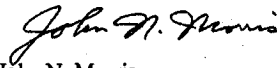
Dear Mr. Aiken:

The State of North Carolina supports the interest of Carteret County in a study for a potential Section 933 Project for use of spoil material from Morehead City Harbor on Bogue Bank beaches.

Please contact us for any assistance that we can provide in getting this study under way. Financial participation by the State of North Carolina in the study and in an eventual Section 933 Project will be determined through the State's budget decision process.

We will look forward to working with Carteret County and with the Corps of Engineers on this study.

Sincerely,

  
John N. Morris

JNM/km

cc: Mr. Frank Rush

1611 Mail Service Center, Raleigh, North Carolina, 27699-1611  
Phone: 919-733-4064 \ FAX: 919-733-3558 \ Internet: [www.ncwater.org](http://www.ncwater.org)  
AN EQUAL OPPORTUNITY \ AFFIRMATIVE ACTION EMPLOYER - 50% RECYCLED / POST CONSUMER WASTE

## EXHIBIT 2

**Board of Commissioners**  
Doug Brady, Chairman  
Jonathan Robinson, Vice-Chairman  
Bettie Bell  
David Wheatly  
Jimmy LaShan  
Sam Stell  
Mac Wells



**County Manager**  
Robert M. Murphy  
Tel: (252) 728-8450  
Fax: (252) 728-2092  
bobm@co.carteret.nc.us  
www.co.carteret.nc.us

ROUTED: 26 Jan 01  
ACTION: PM  
CF: DE  
DD  
DP  
DX  
TS

January 22, 2001

Mr. John Morris, Director  
NC Division of Water Resources  
Archdale Building  
512 N. Salisbury Street  
Raleigh, NC 27611

Dear John:

At its January 8, 2001 meeting, the Carteret County Board of Commissioners approved the attached resolution requesting a Section 933 project for eastern Bogue Banks. We understand that the State of North Carolina must submit such requests to the US Army Corps of Engineers on behalf of local governments, and hereby request that the State submit a formal request to the Corps for a Section 933 project that would utilize dredge spoils currently stored on Brandt Island to nourish Bogue Banks beaches in the winter of 2003-2004.

I have been in contact with Steve Aiken in the Corps' Wilmington District office over the past few months regarding the potential Section 933 project. According to the attached letter from Mr. Aiken, a request for such a project must be made as soon as possible in order to provide enough time for the Corps to complete the required studies and secure the necessary permits to place the sand on the beach strand in 2003-2004. As you know, Carteret County continues to pursue a long-term Shore Protection Project through the Corps. We are currently in the Feasibility Phase, and estimate that initial nourishment under the Shore Protection Project would not occur until FY 2008-2009 or later. The Section 933 project would provide an interim solution to the erosion problems on eastern Bogue Banks until the long-term Shore Protection Project is constructed.

Although details of the project are very preliminary, Mr. Aiken has indicated that the Corps plans to pump out approximately 6 million cubic yards of dredge spoils from the Brandt Island site in 2003-2004. A portion of this material will be placed on the beach in Atlantic Beach and Fort Macon State Park free of charge, as it represents the Corps' least cost disposal method. The remainder of the dredge spoils would be placed as far west on Bogue Banks as feasible, beginning at the eastern town limits of the Town of Pine Knoll Shores. Mr. Aiken has indicated that it appears to be feasible to pump this additional material to a substantial portion, if not all, of Pine Knoll Shores' 4.5 miles of beachfront. You will note that Carteret County is also requesting that a portion of this additional material be placed on 2.5 miles of beachfront in the Town of Indian Beach and the Village of Salter Path at the same time if feasible. All three of these areas of Bogue Banks are faced with severe erosion problems, and the implementation of a Section 933 project would provide much needed storm protection and recreational benefits.

The attached summary sheet contains some of the preliminary estimates for volume, placement, and cost of such a project. You will note that the placement of 4 million (of the 6 million total cubic yards) cubic yards along the 7 miles of beach in Pine Knoll Shores, Indian Beach, and Salter Path would yield approximately 107 cubic yards per linear foot. Based on a total of 4 million cubic yards, the total estimated cost of this project is approximately \$19.2 million. Under the current cost-sharing formula (the State provides 75% of the

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non-federal share), the total State share for this project would be approximately \$5.1 million. Please note that this contribution would not be due to the Corps until FY 2003-2004. Carteret County would provide the remainder of the non-federal share, approximately \$1.7 million, in FY 2003-2004.

Carteret County appreciates the State's assistance as we address the beach erosion problems on Bogue Banks. Your agency has been supportive of our efforts to date, and we hope to continue to receive your support for this and other requests. Please contact me if you need any additional information about Carteret County's Section 933 request. I will be happy to provide any assistance necessary to move this project forward.

Thanks again for all of your help.

Sincerely,

*Frank A. Rush, Jr.*

Frank A. Rush, Jr.  
Assistant to the County Manager

copy: State Senator Patrick Ballantine  
State Senator Scott Thomas  
State Representative Jean Preston  
State Representative Ronnie Smith  
US Representative Walter B. Jones  
US Senator Jesse Helms  
US Senator John Edwards  
Robert Murphy, County Manager  
Colonel James DeLony, US Army Corps of Engineers  
Steve Aiken, US Army Corps of Engineers  
John Sutherland, NCDENR Water Resources  
David Walker, Atlantic Beach Town Manager  
Joe Stroud, Atlantic Beach Mayor  
Betty Carr, Pine Knoll Shores Town Administrator  
Reese Musgrave, Pine Knoll Shores Mayor  
Buck Fugate, Indian Beach Mayor

*Board of Commissioners*  
**Doug Brady, Chairman**  
**Jonathan Robinson, Vice-Chairman**  
**Bettie Bell**  
**David Wheatly**  
**Jimmy LaShan**  
**Sam Stell**  
**Mac Wells**



*County Manager*  
**Robert M. Murphy**  
**Tel: (252) 728-8450**  
**Fax: (252) 728-2092**  
**bobm@co.carteret.nc.us**  
**www.co.carteret.nc.us**

**RESOLUTION REQUESTING THAT THE STATE OF NORTH CAROLINA  
REQUEST A SECTION 933 PROJECT TO PLACE  
BEAUFORT INLET DREDGE SPOILS ON BOGUE BANKS**

WHEREAS, the beaches of Bogue Banks are in need of nourishment to provide storm protection for valuable properties and an attractive recreational beach for visitors to Carteret County, and

WHEREAS, the US Army Corps of Engineers is scheduled to pump out the Brandt Island dredge spoil disposal site (which holds material dredged from Beaufort Inlet) in the winter of 2003-2004, and

WHEREAS, Carteret County believes it is essential that dredge spoils derived from navigation dredging activities be placed back on the beaches of Bogue Banks, and

WHEREAS, the Corps estimates a volume of approximately 6 million cubic yards of sand is available for placement on the beaches of Bogue Banks from this pump-out, and

WHEREAS, the beaches of Fort Macon and Atlantic Beach will receive a portion of this sand free of charge because it represents the Corps' least cost disposal area, and

WHEREAS, the Corps has alerted Carteret County to the possibility of placing the balance of this sand on the beaches of Pine Knoll Shores and, if feasible, Indian Beach and Salter Path if a Section 933 project is authorized and funded, and

WHEREAS, a Section 933 project in FY 2003-2004 would provide additional sand for these areas of Bogue Banks after proposed locally funded projects occur in FY 2001-2002 and before the projected date of the initial nourishment under the Shore Protection Project in FY 2008-2009, and

WHEREAS, the additional cost to pump sand from Brandt Island beyond Atlantic Beach is estimated at approximately \$19.2 million (preliminary estimate), and

WHEREAS, under a Section 933 project, the Corps would provide 65% of the funding, and the State of NC has historically provided an additional 26.25% of the funding, leaving the Carteret County share at 8.75%, and

WHEREAS, this cost-sharing arrangement would result in an estimated local cost of \$1.7 million, and no financial commitment is necessary until FY 2003-2004, and

WHEREAS, the State of NC must make the formal request for a Section 933 project on behalf of Carteret County, and

WHEREAS, the Carteret County Beach Preservation Task Force has passed a resolution urging Carteret County to request that the State of NC formally request a Section 933 project for Bogue Banks,


NOW, THEREFORE, BE IT RESOLVED by the Carteret County Board of Commissioners that Carteret County hereby requests that the State of NC formally request that the US Army Corps of Engineers undertake a Section 933

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project to place Beaufort Inlet dredge spoils on Bogue Banks when Brandt Island is pumped out in the winter of 2003-2004. The County Manager is hereby authorized to submit this request to the State of North Carolina.

Adopted this 8th day of January, 2001.

  
W. Douglas Brady, Chairman

ATTEST:

  
Robert Murphy, Clerk to the Board

## EXHIBIT 3

### Board of Commissioners

Bettie H. Bell, Chair  
Doug Brady  
Lynda Clay  
Jack Dawsey  
Raymond N. Muns  
Jonathan Robinson, Vice-Chair  
David Wheatly



### Interim County Manager

Bettie H. Bell  
Tel: (252) 728.8450  
Fax: (252) 728.2092

[www.co.carteret.nc.us](http://www.co.carteret.nc.us)

Routed: 13 Jan 03  
Action: PM  
Sus: None  
CF: DE, DD, DP, DX

January 6, 2003

Colonel Charles R. Alexander  
U.S. Army Corps of Engineers  
Wilmington District  
P.O. Box 1890  
Wilmington, North Carolina 28402-1890

Re: Project Cooperation Agreement  
Morehead City Harbor Section 933 Project  
Bogue Banks, Carteret County

Dear Colonel Alexander:

The purpose of this correspondence is to confirm Carteret County's intent and willingness to execute a Project Cooperation Agreement (PCA) with the U. S. Army Corps of Engineers (USACE) regarding the Section 933 Project that has been developed for Bogue Banks and is scheduled for Federal fiscal year 2004. It is anticipated that the Project will be constructed concurrently with operation and maintenance activities associated with the Morehead City Harbor Federal Navigation Project. The decision to execute a PCA is predicated on the information provided by the Wilmington District and their dedication in formulating a locally-preferred plan.

It is the County's understanding as the local sponsor that the estimated non-federal cost for design and construction of the Section 933 Project is approximately \$6.3 million. The federal cost is approximately \$11.6 million. It is our understanding that this cost will be finalized with the completion of the Section 933 Report in late January 2003 and is still subject to change once bids are opened in August/September 2003. Under State statutory provisions guiding the North Carolina Water Resources Development Project Grant Program, local governments are eligible for up to 75 percent of the non-federal share of beach protection projects where public access is allowed and provided for. The County and the N.C. Division of Water Resources, the agency responsible for administering water resource grants, have been in communication regarding the design and cost parameters of the Section 933 Project. The N.C. Division of Water Resources generally supports local funding requests and has already shown strong support for the Section 933 Project, however State funding is dependent upon appropriation decisions by the General Assembly and upon the priority of the Morehead City Harbor Section 933 Project compared to other projects throughout the State. The County anticipates the local cost share to be approximately \$1.6 million, assuming successful procurement of a N.C. Water Resources Development Project Grant.

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The County, in direct cooperation and agreement with the municipalities of Pine Knoll Shores and Indian Beach, will secure necessary easements, access/parking accommodations, and has a revenue stream dedicated to cover the local, non-federal costs for the Section 933 project. The municipalities of Pine Knoll Shores and Indian Beach have forwarded us correspondences ensuring their abilities and willingness to participate in the Project. The County will also provide all other terms and requirements of local cooperation as may be required for construction of the project. The County is in agreement with the Project as presented in the Evaluation Report dated January 2003, and intends to sign a PCA when and as required.

The Morehead City Harbor Section 933 Project will be a tremendous asset for the County, State, and Country in preserving, protecting, and improving the recreational benefits, environmental habitats, economic well-being, and shore protection capabilities associated with wide and healthy beaches. The USACE's support and assistance in expediting the approval of the Morehead City Harbor Section 933 Project is most greatly appreciated. Please do not hesitate to contact the County's Shore Protection Office if you require any assistance or additional information.

Sincerely,



Bettie Bell

Chairperson, Carteret County Board of Commissioners

Cc: Mayor Buck Fugate, Indian Beach  
Mayor Bob Gallo, Pine Knoll Shores  
John Morris, N.C. Division of Water Resources  
The Honorable Walter B. Jones, Jr., United States Congress  
The Honorable Elizabeth Dole, United States Senate  
The Honorable John R. Edwards, United States Senate



**MOREHEAD CITY HARBOR  
CARTERET COUNTY, NORTH CAROLINA  
SECTION 933  
EVALUATION REPORT**

**APPENDIX B**

**FEDERAL STANDARD -  
BASE DISPOSAL PLAN**



## **APPENDIX B**

### **FEDERAL STANDARD - BASE DISPOSAL PLAN**

The purpose for the Brandt Island pump-out is to create capacity for future maintenance dredging of Morehead City Harbor. In addition to this general purpose, there exist specific criteria for the disposal of material on adjacent area beaches:

- a. minimize scarping;
- b. minimize trapped/ponded water on beach;
- c. minimize lateral and offshore losses due to excessive berm width; and
- d. minimize losses into entrance channel.

These criteria address the Federal standard as defined in 33 CFR Part 335 where identified alternatives should “represent the least costly alternatives consistent with sound engineering practices and meeting the environmental standards...” Therefore, considering the above factors, the disposal fill should:

- a. be placed at the natural berm elevation, which historic surveys and monitoring have demonstrated to be +7 ft NGVD;
- b. have acceptable berm widths to minimize risk of channel shoaling;
- c. have transitions at the lateral extents to tie in with the adjacent shoreline

The total volume of material available for the November 2003 Brandt Island Pumpout and Inner Harbor maintenance is approximately 4.8 Million cubic yards (M cy). The distribution of the 4.8 M cy consists of 4.0 M cy presently in the Brandt Island Disposal Facility and an additional 0.8 M cy estimated dredging of the Inner Harbor for November 2003.

It is assumed that all of the material will be removed as part of the Least Cost Disposal action. Actual quantity removed will depend on available funding. Based on previous beach nourishment experience in NC and at Bogue Banks, it is also assumed that an average of 10% losses will occur during dredging, pumping and placement operations (which is an accepted standard loss rate for this type of material being dredged, pumped and placed via pipeline dredge). Therefore, it is estimated that the resulting volume of material that will remain on the beach is approximately 4.3 M cy.

Beach nourishment design practice distinguishes between a “construction” profile and a “design” profile because as a practical matter, dredges and earth moving equipment cannot distribute sand below the approximate mean low water (MLW) elevation (i.e., below water). Therefore, sand for beachfill is placed in a construction profile, which includes a wider berm than ultimately desired. This sand quickly re-distributes along the profile nourishing the below water areas to the depth of closure resulting in the design profile (which includes the design berm width). Design berm widths ranging from 50 ft to 200 ft were analyzed for this analysis. The upper and lower bounds are based on historic beachfill experience. Comparison of the design template to existing beachfill conditions as determined through recent surveys resulted in required volumes per linear ft and associated construction width. The minimum 50-ft design berm results in an average construction berm of 140 ft with an average of 88 cubic yards per linear ft being placed along the beach. The large 200-ft design berm, comparable to that placed along Fort Macon during the 1994 beach disposal operation, results in an average construction berm width of 341 ft with an average of 199 cubic yards per linear ft being placed along the beach. Table 1 summarizes all berm widths evaluated with resulting construction berm widths and unit volume requirements.

Previous disposal experience at Fort Macon has indicated placement of large berm widths near the inlet may result in negative impacts (i.e., excessive shoaling) on the adjacent channel. During the 1994 disposal operation, approximately 1.15 M cy were placed in the vicinity of Fort Macon, resulting in an average construction berm width of 340 ft and transition angles of 10 to 12 degrees. These large transition angles and the offshore extent of the fill exposed to the inlet’s currents contributed to the rapid loss of material from the disposal areas. While the disposal of Morehead City harbor dredged material on the east end of Bogue Banks has substantially improved the condition of this section of the island, the disposal practice,

which creates inordinately wide beaches with very sharp transition angles, is not the most efficient use of the material (USACE 2001, Summary of Morehead City Harbor Section 111 Study). The analysis of the performance of the three major disposal operations on the east end of Bogue Banks revealed rapid loss of material from the disposal areas. Significant portions of the material placed on the Fort Macon shoreline in 1978 and 1994 appeared to be transported directly into Beaufort Inlet within a few years following disposal. The return of this material to Beaufort Inlet may be partly responsible for the increase in dredging required to maintain the Morehead City Harbor project, but a definitive conclusion in this regard is not possible due to the increased shoaling rates associated with the incremental increases in project depth since 1978.

For the fixed volume of 4.8 M cy to be removed from Brandt Island and the Inner Harbor and pumped throughout the project area, the lowest cost for a contiguous beachfill placement for each berm width was evaluated. The least cost for all cases (berm widths), resulted from starting placement at Fort Macon and extending westward. Figures 1 and 2 display the cumulative volume and cumulative cost, respectively for uniformly placing the 4.8 Million cy from Fort Macon until the location where material ran out. Figure 1 shows that a 50-ft berm could be spread uniformly from Fort Macon through most of Pine Knoll Shores, while the 200-ft berm could only be placed approximately halfway through Atlantic Beach.

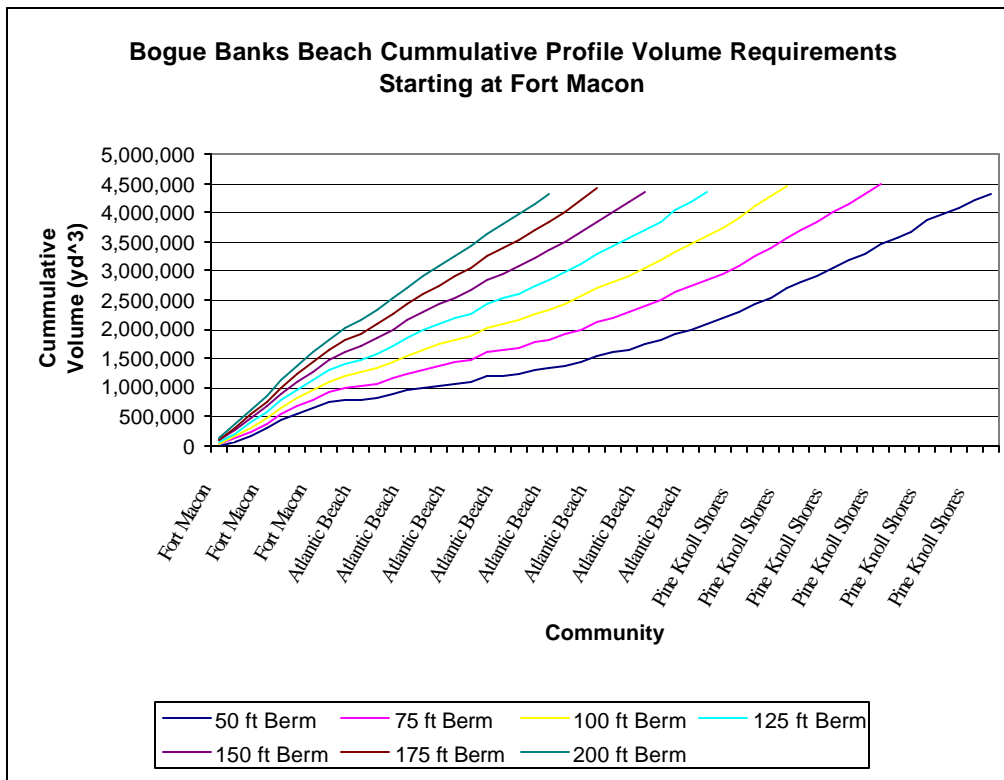
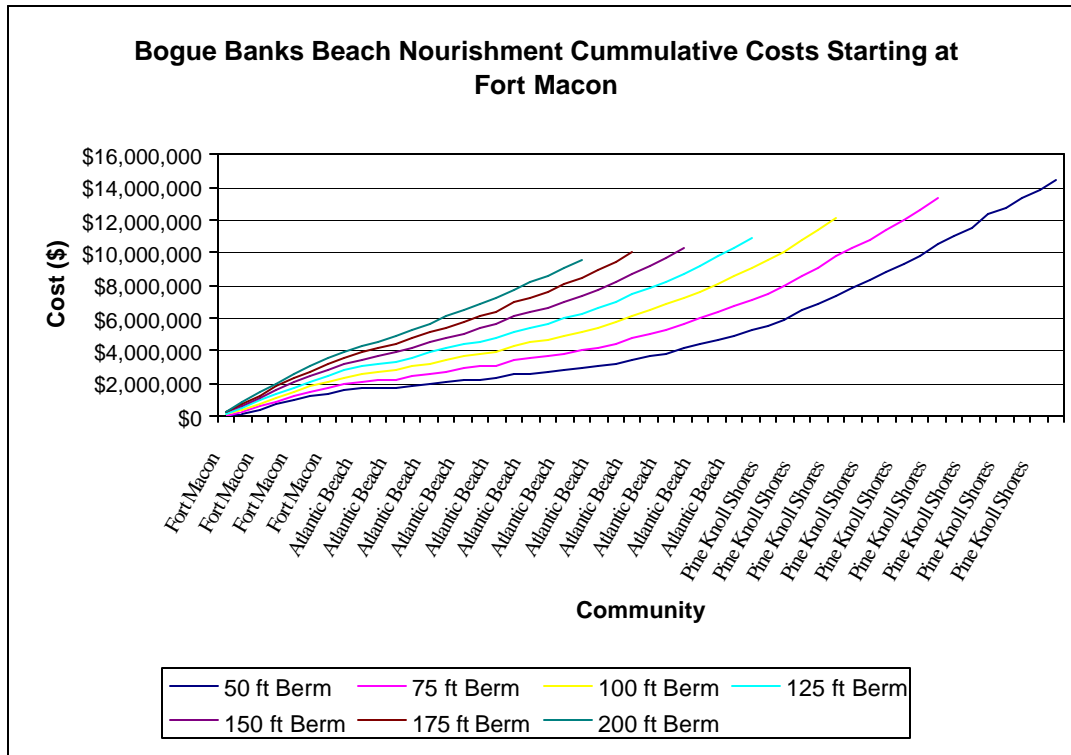


Figure 1. Cumulative volume requirements for various berm widths





**Figure 2. Cumulative costs of placing material**

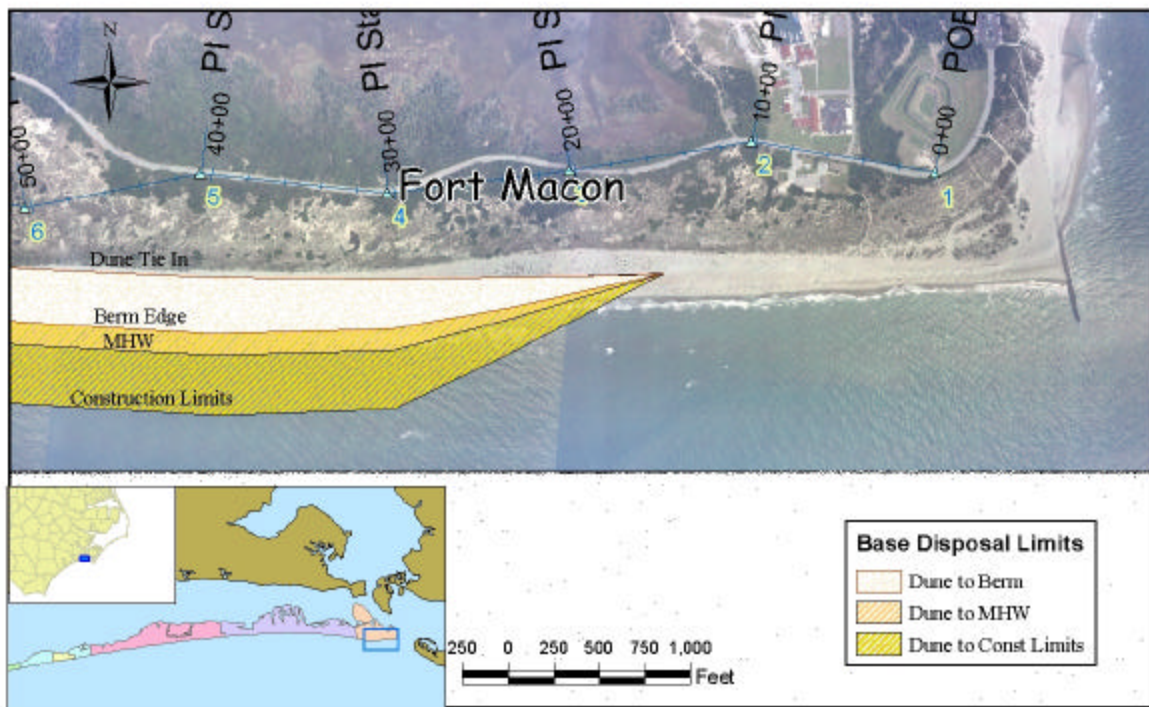
As indicated in Table 1, the least cost for pumping 4.8 M cy of sand onto the beach is \$9.488M for the 200-ft design berm width. However, this is not a practical engineering alternative due to the high risk of fill loss and increase in channel shoaling. Therefore, to minimize risk of entrance channel shoaling and adjacent fill losses, we suggest significantly reducing the berm width. The acceptable berm width was determined by comparing the average volume of material placed per ft along the beach to recently constructed beachfills with acceptable performance. Several USACE projects along beaches that were classified as being in relatively “poor” shape have required unit volumes on the order of 140 cubic yards per ft and have thus had acceptable performance.

<b>Table 1. Berm volumes and costs</b>				
<b>Design Berm width (ft)</b>	<b>Brandt Island and Inner Harbor (4.8 Million Cubic Yards)</b>			
	<b>Length</b>	<b>Avg Const Berm (ft)</b>	<b>Avg Vol/ft (c.y./ft)</b>	<b>Cost</b>
50	50,000	140	88	14,341,248
75	42,250	175	104	12,705,694
100	36,500	209	120	11,540,078
125	32,000	240	138	10,741,541
150	28,000	275	157	10,164,736
175	25,000	309	178	9,765,095
200	22,250	341	199	9,488,025

From an engineering perspective, a Base Disposal Plan berm width of near 125 ft design width is ideal because the required volume/linear foot (138 cy/lf) is consistent with normal beach nourishment practices for stability on the beach. Environmental staff indicated that an environmentally acceptable berm width based on needs for sea turtle nesting was a design berm width of 150 ft (construction berm width of 275 ft). Though this width is slightly larger than the preferred width for stability on the beach, it is only 25 ft larger

in design (35 ft in construction) and will meet sound engineering practice especially considering the needs for construction of a berm as wide as possible.

This Base Disposal Plan (150 ft design berm) will start in Fort Macon at Station 15+25, leaving no sand placed within approximately 2,250 ft of the jetty (Figure 3). Station 0+00 is located 725 ft west of the jetty. The fill will transition for approximately 1,500 ft towards the west to achieve a full 150 ft berm at Station 30+00. Assuming all of the 4.8 M cubic yards available is placed from this location westward with consideration of the fishing piers, the 150 ft design berm will end approximately 900 ft east of the Atlantic Beach/Pine Knoll Shores border at Station 305+00 (Figure 4). The presence of a fishing pier in the vicinity of the Atlantic Beach / Pine Knoll Shores border prevents placement of the material throughout Atlantic Beach (Figure 5). It is recommended the Base Disposal limits consist of all of Fort Macon and Atlantic Beach for economic analyses associated with the Section 933 Study.



**Figure 3. Base Disposal Limits in the vicinity of Fort Macon.**

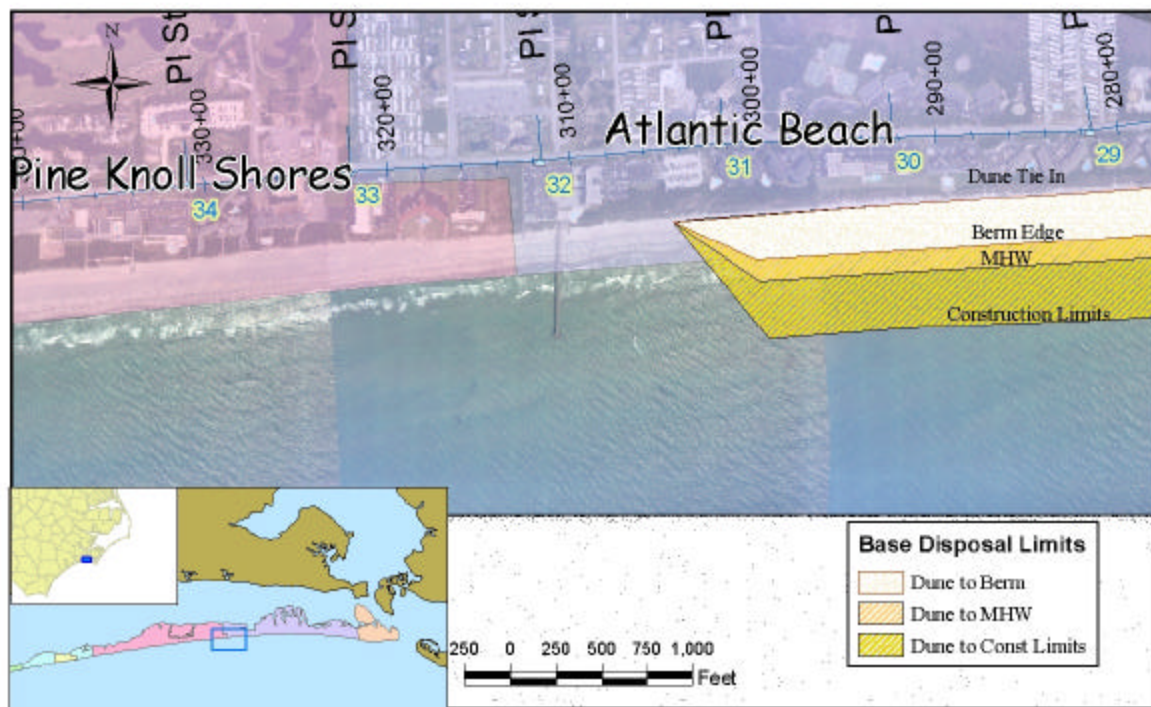


Figure 4. Base Disposal Limits in the vicinity of Atlantic Beach and Pine Knoll Shores border

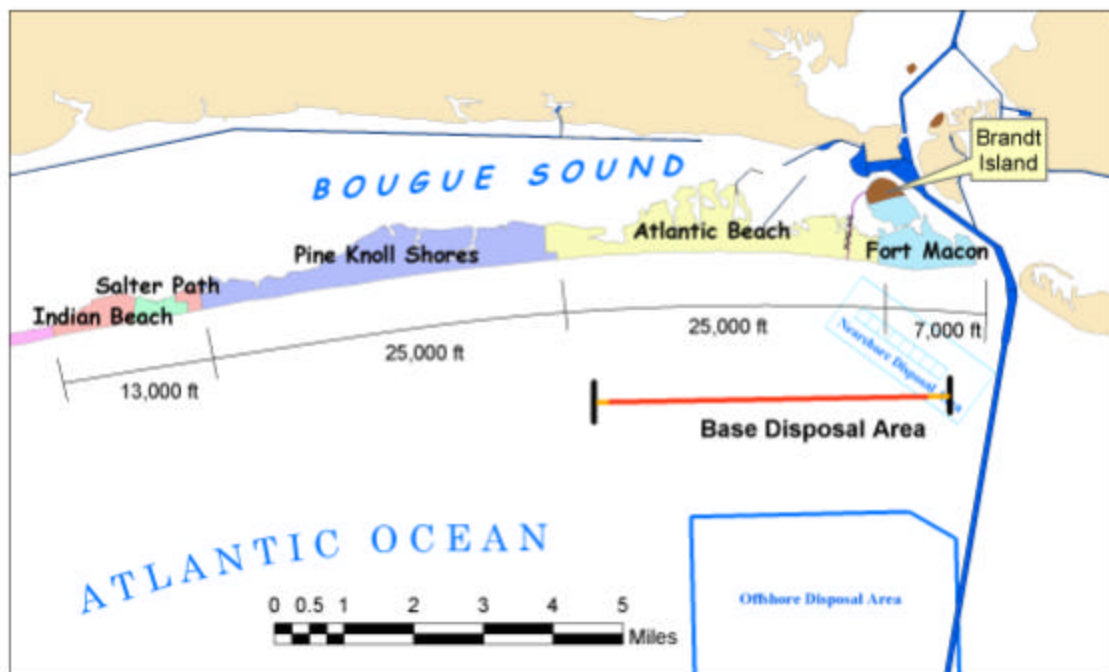


Figure 5. Morehead City Section 933 Base Disposal Plan Location.



**MOREHEAD CITY HARBOR**  
**CARTERET COUNTY, NORTH CAROLINA**  
**SECTION 933**  
**EVALUATION REPORT**

**APPENDIX C**



# C Coastal Analysis

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Detailed investigations of the geomorphologic conditions and coastal processes associated with Bogue Banks, North Carolina were conducted through a combination of field data analysis and numerical modeling. Numerical simulations of wave transformations, tidal circulation, sediment transport, and storm-induced beach profile response along Bogue Banks were conducted to evaluate and compare engineering alternatives to reduce storm damages in the vicinity of Morehead City Harbor.

The purpose of this chapter is to summarize the technical details of the coastal analysis and to describe the hydraulic conditions that will be used to evaluate the Base Disposal and Recommended Plans as described in the Main Report. First, the existing beach conditions (beach profiles and shoreline positions) and representative coastal processes (waves, water levels, sediment transport) will be described. Next, simulations of storm conditions, storm-induced beach profile response modeling, shoreline response modeling, and the generation of frequency-of-occurrence relationships for select response parameters will be discussed. Finally, the inputs into the storm damage model are presented.

## Existing Conditions

Bogue Banks is a barrier island with a southward facing ocean shoreline stretching approximately 25 miles between two large tidal inlets, Bogue Inlet to the west and Beaufort Inlet to the east. The Banks are surrounded by Bogue Sound on the north and Onslow Bay of the Atlantic Ocean on the south. The island is made up of the Fort Macon State Park, the Towns of Atlantic Beach, Pine Knoll Shores, Indian Beach, and Emerald Isle and the unincorporated area of Salter Path (Figure C-1). Morehead City Harbor is located in the Beaufort Inlet complex between Bogue Banks to the west and Shackleford Banks to the east. Brandt Island is located north of Fort Macon State Park in the Inner Harbor section of Morehead City Harbor.

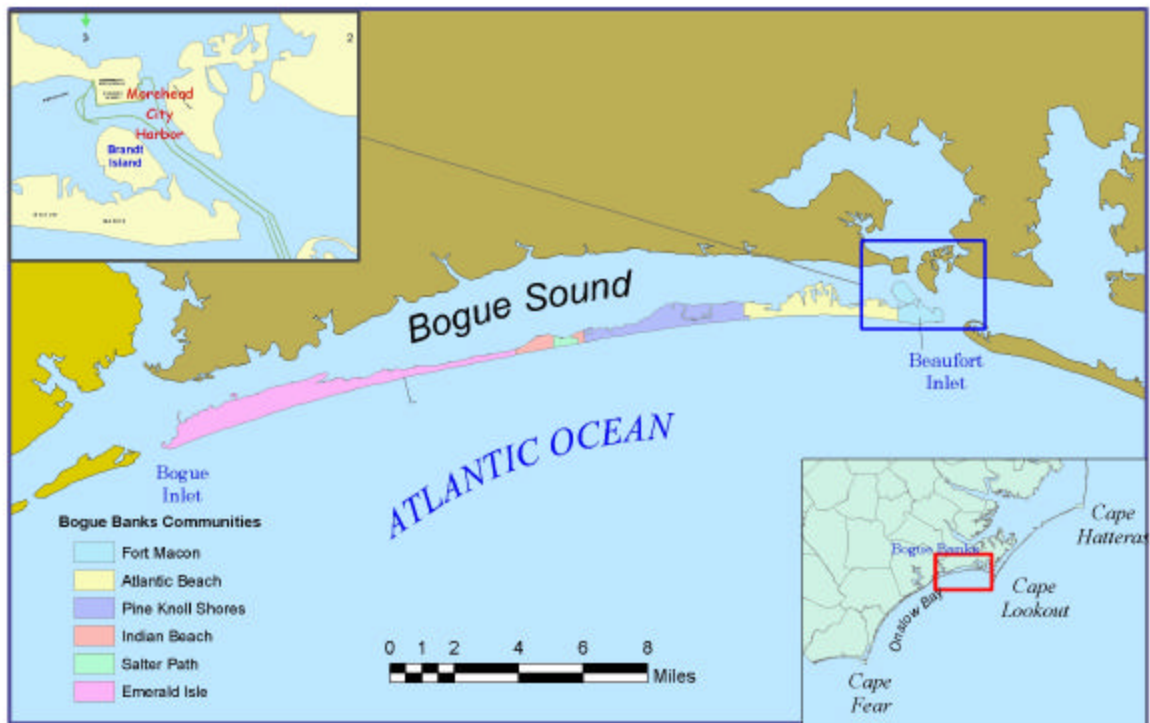


Figure C-1. Bogue Banks Location Map.

Existing and historical conditions at Bogue Banks, North Carolina were characterized utilizing aerial photographs, bathymetric and topographic survey data, National Ocean Service (NOS) water level data, NOS LIDAR data, Wave Information Studies (WIS) wave hindcast data and coastal processes models. Historical shoreline positions, delineated from aerial photographs, LIDAR data, and beach profile data document the range in shoreline conditions and relative beach stability in the Bogue Banks area over an extended time period. Recent bathymetry and topographic surveys served as input for coastal processes model grids. NOS water level data were used to drive coastal process models and to define water level datum relationships for the area. Coastal process models were used in this investigation to characterize wave and current conditions for existing conditions, develop storm conditions used in the storm damage analysis, and to characterize performance of alternatives designed to reduce storm damage potential.

### Beach Profile Characteristics

During the Fall of 2001, beach profile data were collected along 129 transects at approximately 1000 ft spacing throughout the island (Figure C-2). Dune crest elevations typically exceeded +14 ft NGVD, indicating a healthy dune system. The average berm elevation is approximately +7 ft NGVD with an average nearshore slope of 1V:25H. The existing berm widths however are very narrow, allowing the toe of the dune to be inundated and exposed to direct wave attack during moderate storm surge events. The



beach profile data were utilized with the structure database and historic shoreline change rates to develop representative reaches as shown in Figure C-3.

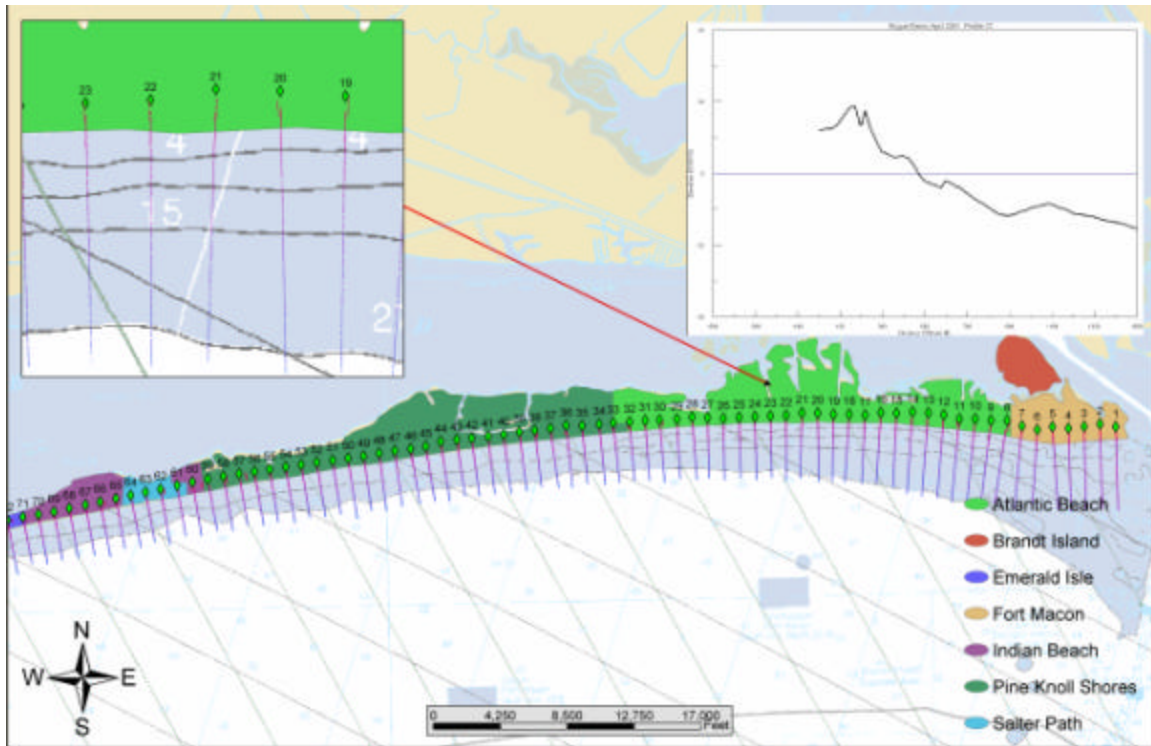


Figure C-2. Bogue Banks April 2001 Beach Profile Survey Layout.

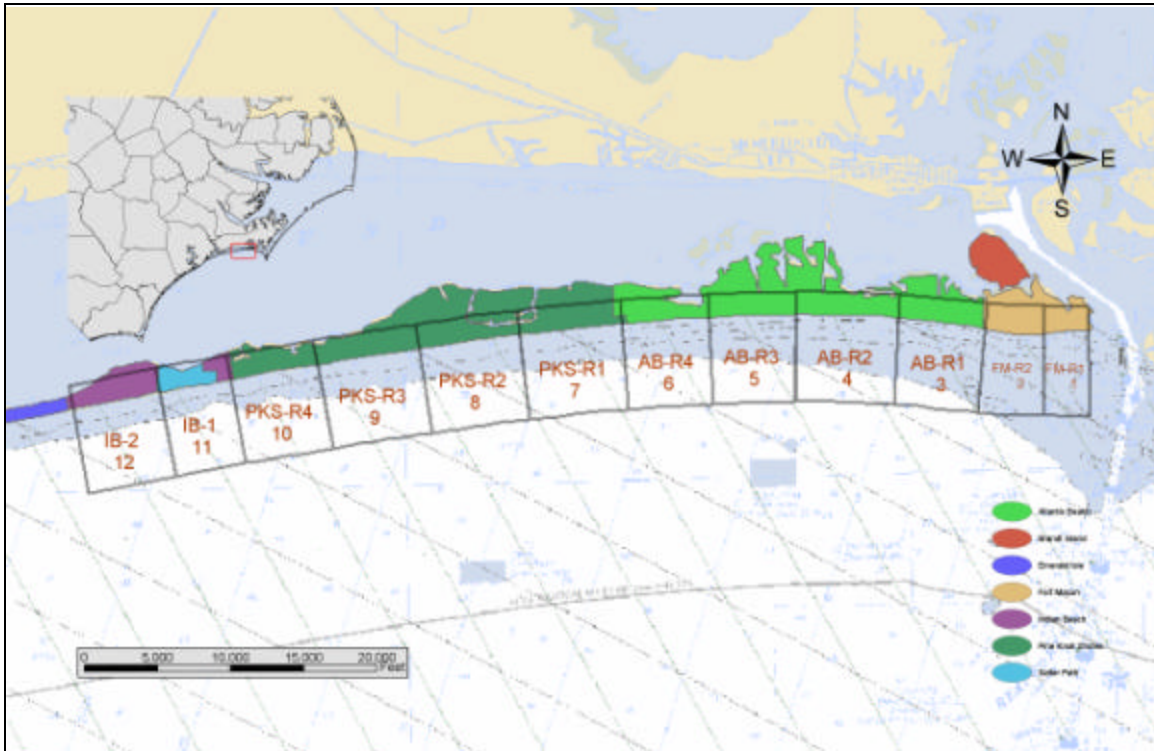


Figure C-3. Representative Reach Locations.

Representative beach profiles were developed for each of the representative reaches by combining the 1000-ft spaced profiles together. Significant care was taken to maintain important features such as the berm and nearshore bar. Figures C-4 through C-7 show the representative beach profile conditions developed. The profiles were utilized as input into the storm damage modeling for existing conditions.

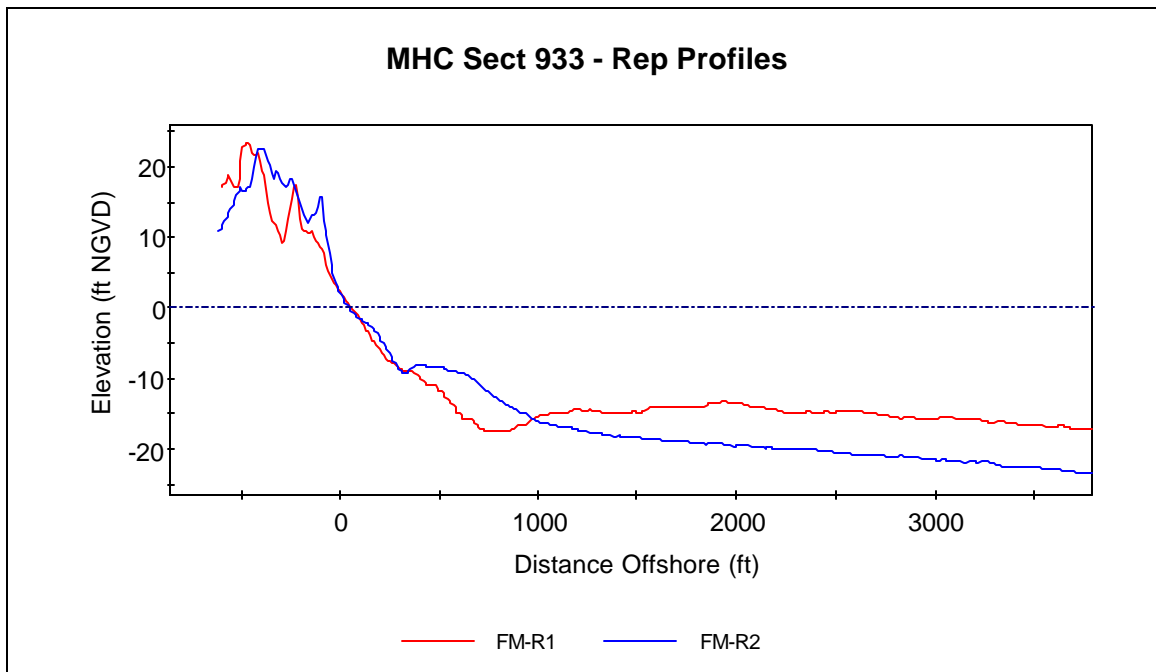


Figure C-4. Representative Beach Profiles at Fort Macon.

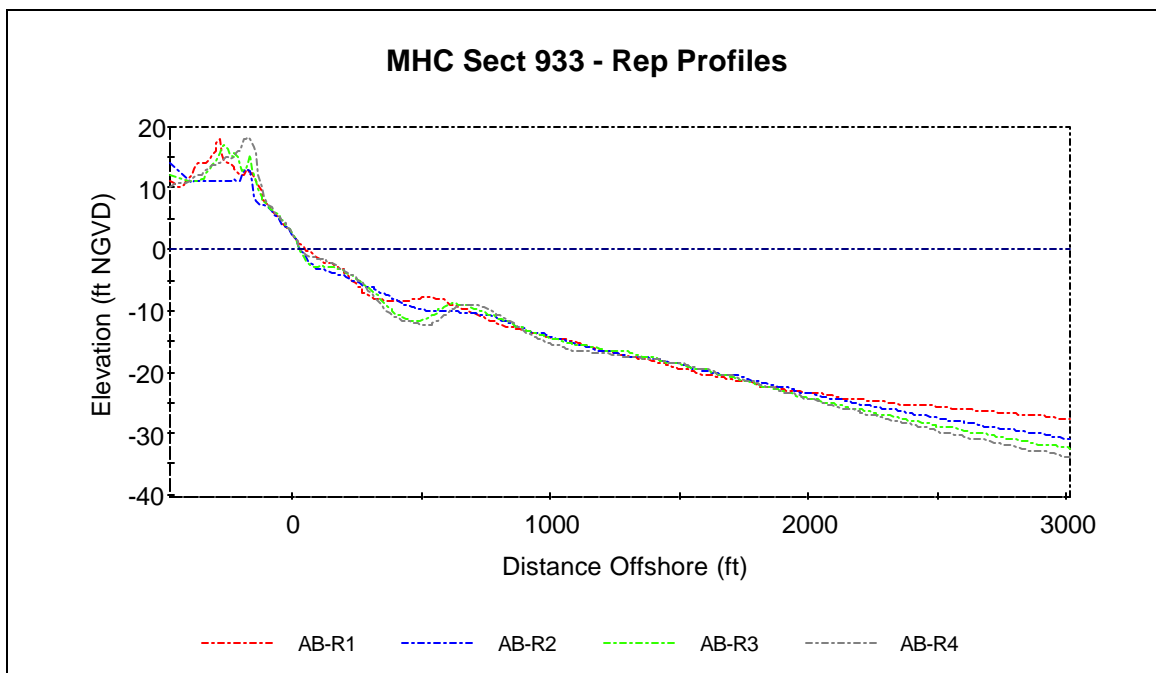


Figure C-5. Representative Beach Profiles at Atlantic Beach.

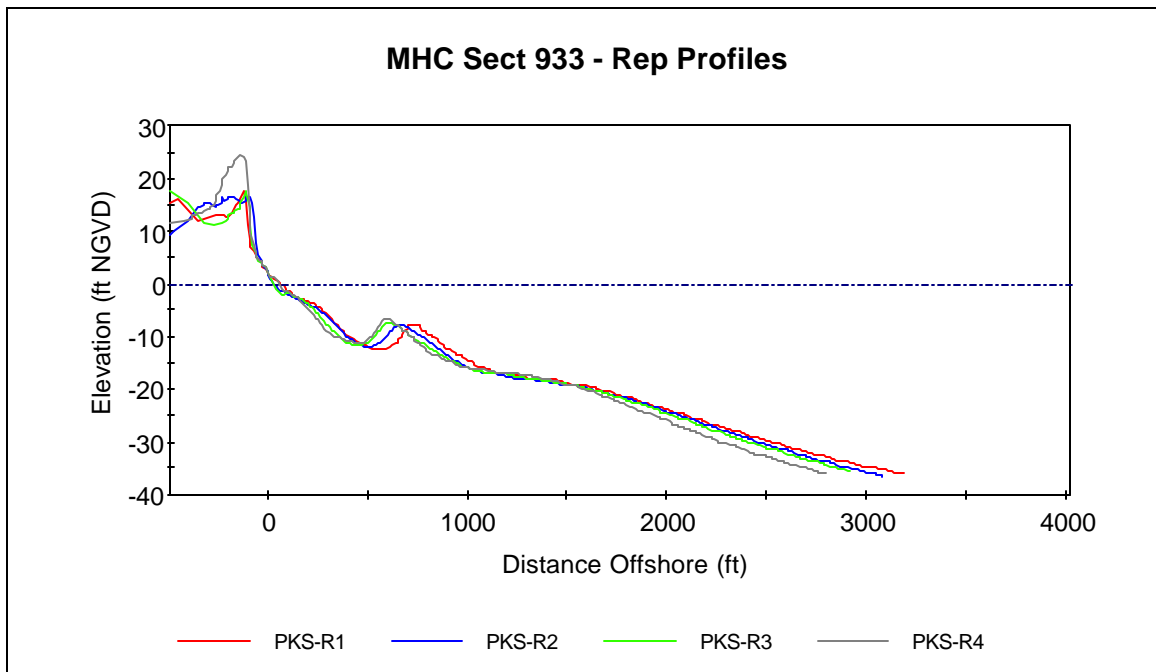


Figure C-6. Representative Beach Profiles at Pine Knoll Shores.

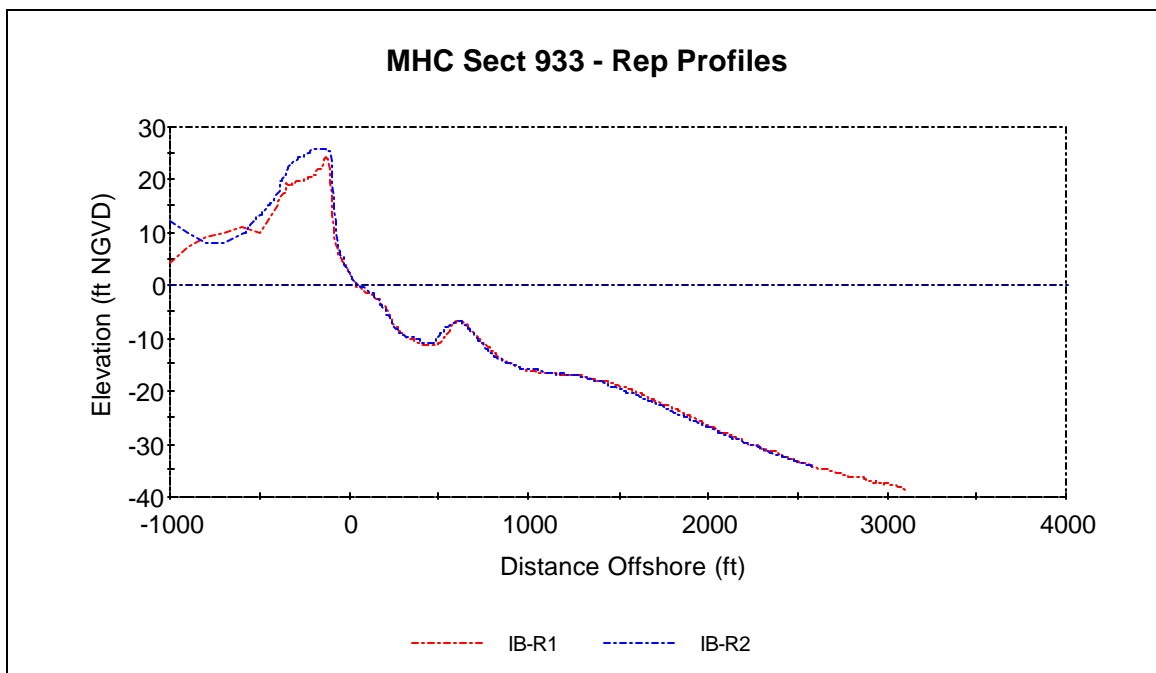


Figure C-7. Representative Beach Profiles at Indian Beach.

## Shorelines

A detailed examination of historic and recent shoreline conditions was performed to compute shoreline change rates and to serve as input into the sediment transport analysis. All shorelines utilized were projected to the North Carolina State Plane (NAD 83)

coordinate system, interpolated to previously established shore-perpendicular transects, and added to the shoreline geodatabase. A Geographic Information System (GIS) was utilized to help visualize the range in shoreline conditions.

### Shoreline Database

Shoreline positions were developed for numerous dates through analysis of NOS T-sheets, aerial photography, beach profiles, and LIDAR data. Table C-1 displays the shoreline dates and corresponding sources available for use in shoreline change analysis.

Table C-1. Shoreline Data Inventory.

Date	Type	Source
03/30/43	NOS T-Sheet	NC DCM
08/16/59	NOS T-Sheet	NC DCM
05/11/78	Beach Profile Survey	USACE
12/08/80	Interpreted Aerial Photography	NC DCM
08/25/86	Beach Profile Survey	USACE
06/17/92	Interpreted Aerial Photography	NC DCM
09/02/97	LIDAR	NOS CSC
08/02/98	LIDAR	NOS CSC
06/10/99	LIDAR	NOS CSC
06/20/00	Beach Profiles and Scatter	UNC
08/08/00	LIDAR	NOS CSC
04/30/01	Beach Profile Survey	USACE
5/15/2002	Beach Profiles and Scatter	UNC
8/15/2002	Beach Profiles and Scatter	UNC

The shoreline position extracted for each data set was the Mean High Water (MHW) contour. The MHW contour was derived through both aerial photography interpretation and topographic survey data analysis. The North Carolina Department of Environmental and Natural Resource Division of Coastal Management (NC DCM) shoreline database for the Bogue Banks area was provided to the USACE. Shoreline positions derived for the database were commonly done through interpretation of aerial photography. The database consists of a series of baselines parallel to the shore and shore perpendicular transects as shown in Figure C-8. There are 73 transects spaced every 50 meters for each baseline. The Bogue Banks area consists of 13 baselines from Bogue Inlet to Fort Macon. Shoreline positions at each of the transects were referenced in the original database as distance from the seaward most location of the transect. The relative distances along each transect from one shoreline date to another provides a quick means of evaluating shoreline change. Additionally, geographic coordinates were computed for each transect value by projecting the distance along the transect azimuth from the transect origin. This geo-referenced shorelines improved visualization of the relative shoreline conditions, especially when viewed along with recent aerial photography as shown in Figure C-9.

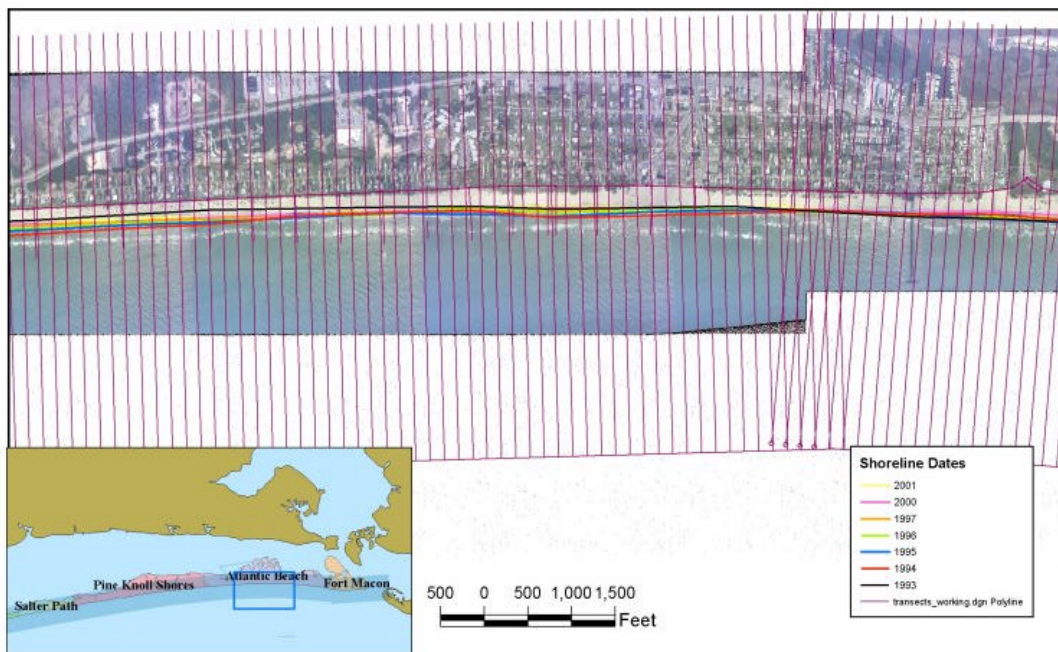


Figure C-8. NC CZM Transect Locations along Bogue Banks.

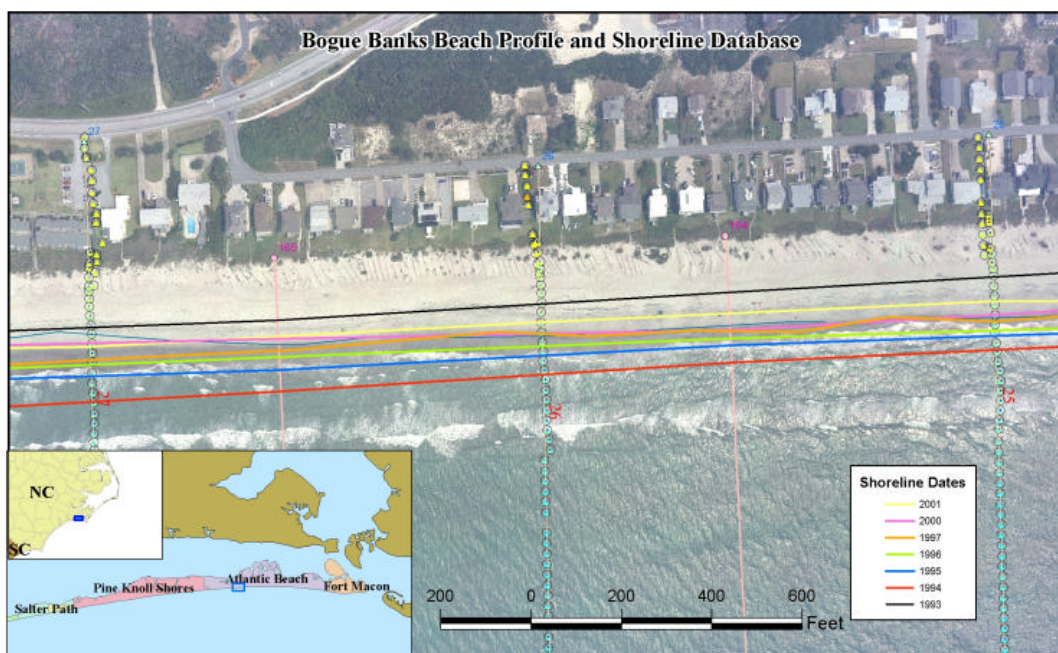


Figure C-9. Recent Shoreline Conditions on July 2002 Imagery Along Atlantic Beach, NC.



In addition to the CZM shoreline database, several recent shorelines were derived through analysis of topographic survey data. Historical beach profile survey data have been conducted by the Corps of Engineers from Fort Macon through Atlantic Beach semi-annually since 1986. Several beach profile surveys were conducted for the entire island, including the years 1978 and 2001. The beach profiles are typically spaced approximately 1,000 ft alongshore. The MHW elevation is +2.21 ft above NGVD. The distance of the MHW contour from the profile origin along each profile was computed. The shoreline positions were then projected (using known profile origin and azimuth) and interpolated onto the CZM transects.

Scatter data sets were also utilized to compute shoreline positions. Three topographic LIDAR data sets were obtained from the NOS Coastal Services Center. Each survey provides a high density coverage from the water line typically through the second row of houses. Figure C-10 displays the August 2000 LIDAR data overlaid on July 2002 imagery. The SHOALS Toolbox software (contained in the Surfacewater Modeling Software) was utilized to extract the MHW contour from the high density data. The MHW contour was interpolated to the transect lines and added to the geodatabase.

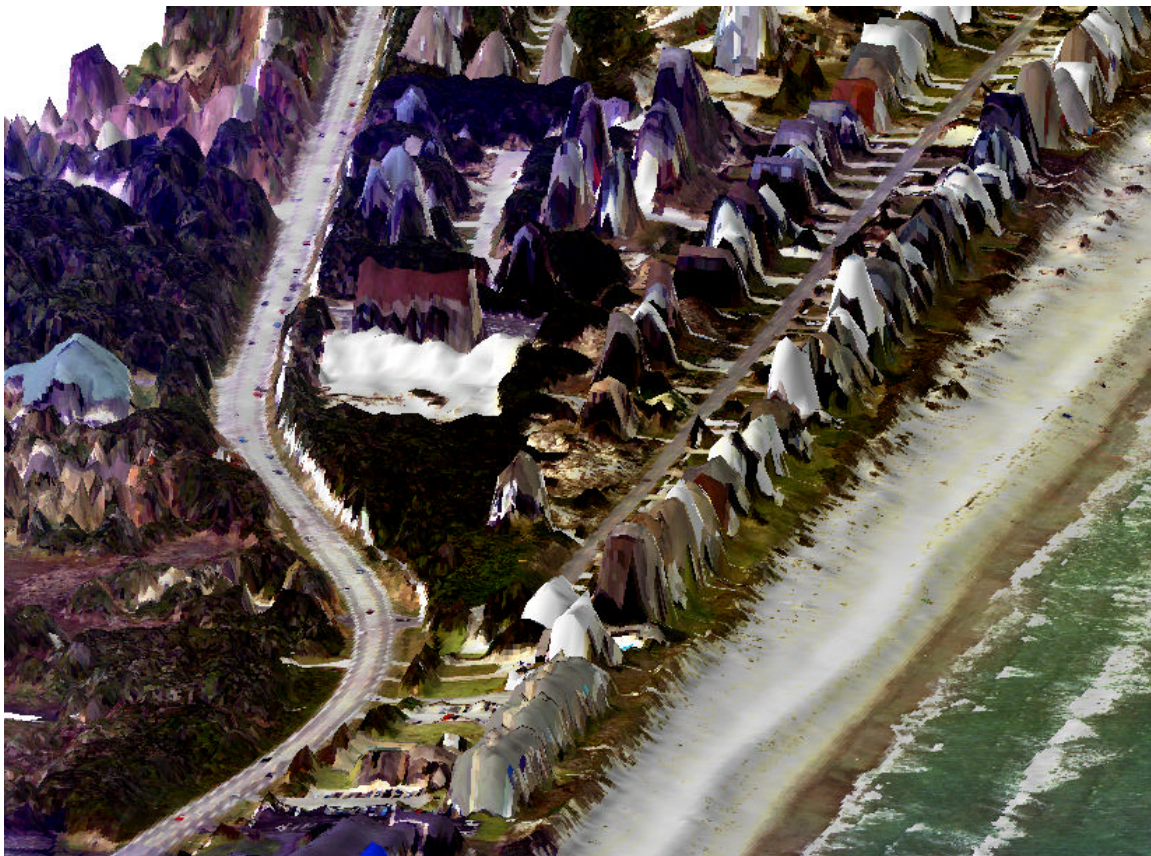


Figure C-10. Oblique view August 2000 LIDAR surface overlaid on July 2002 Imagery.

Prior to the construction of the local beachfill (July 2000, Pine Knoll Shores through Indian Beach), Carteret County contracted UNC-Chapel Hill Institute of Marine Science Personnel to conduct quarterly surveys along Bogue Banks. The survey was conducted

utilizing a combination of ATV and Jet boat equipment with RTK capabilities. In addition to surveying defined profile lines, multiple shore-parallel lines were surveyed to better define the berm and nearshore conditions. SMS was utilized to extract the MHW contour for each survey. Figure C-11 displays three surveys in the vicinity of the local beachfill.



Figure C-11. Shoreline position (MHW) data derived from survey data displaying influence of local beachfill.

### **Shoreline Change Rates**

Rates of erosion/accretion were computed for all communities of Bogue Banks using various shoreline position data sets derived from aerial photography, LIDAR data, and beach profile data with dates ranging from 1978 to present. North Carolina's Division of Coastal Management updates shoreline change rates from aerial photographs every 6 years. Erosion maps for Bogue Banks are available for Bogue Banks for 1980, 1986, and 1992. Updated rates using 1998 shorelines are expected to be released to the public by CNC CZM early 2003. The resulting erosion rates are computed as changes from a baseline set of photos (i.e., 1978). The Corps of Engineers performed similar analyses in a study to evaluate the effects of the Morehead City Harbor dredging activities (Section 111, June 2001). Both analyses utilized an end point method to compute the shoreline change rates. Figure C-12 displays the NC CZM published shoreline change rates for 1992.



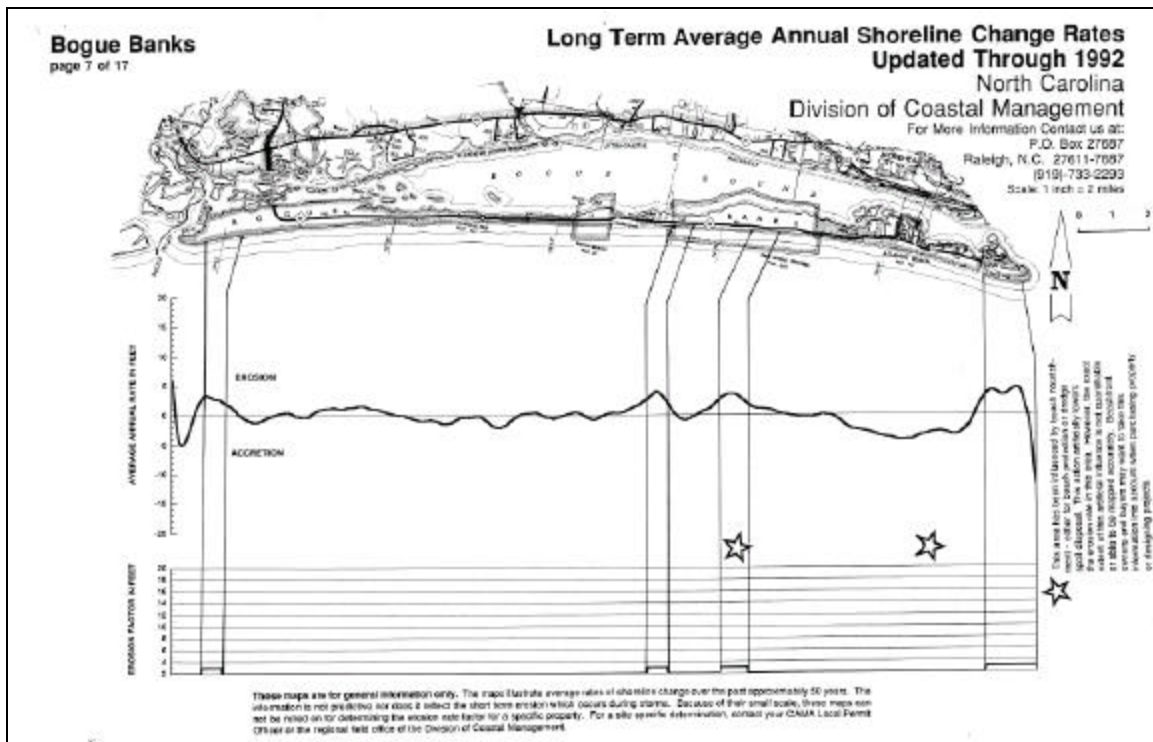


Figure C-12. NC DCM Published Shoreline Change Rates for Bogue Banks.

A detailed shoreline change analysis was performed for this study, incorporating recent LIDAR data and beach profile data with the objective of computing true “background” erosion rates in the vicinity of previous beachfill activities (i.e., Brandt Island pumpout to Atlantic Beach). Shoreline change rates were computed by performing a least-squares fit through select shoreline dates as shown in Figure C-13. A computer program was developed to rapidly compute shoreline change rates for user-specified shoreline data and baseline locations. This utility improved the effectiveness of computing “background” erosion rates by selecting locations and dates before or after beachfill placement.

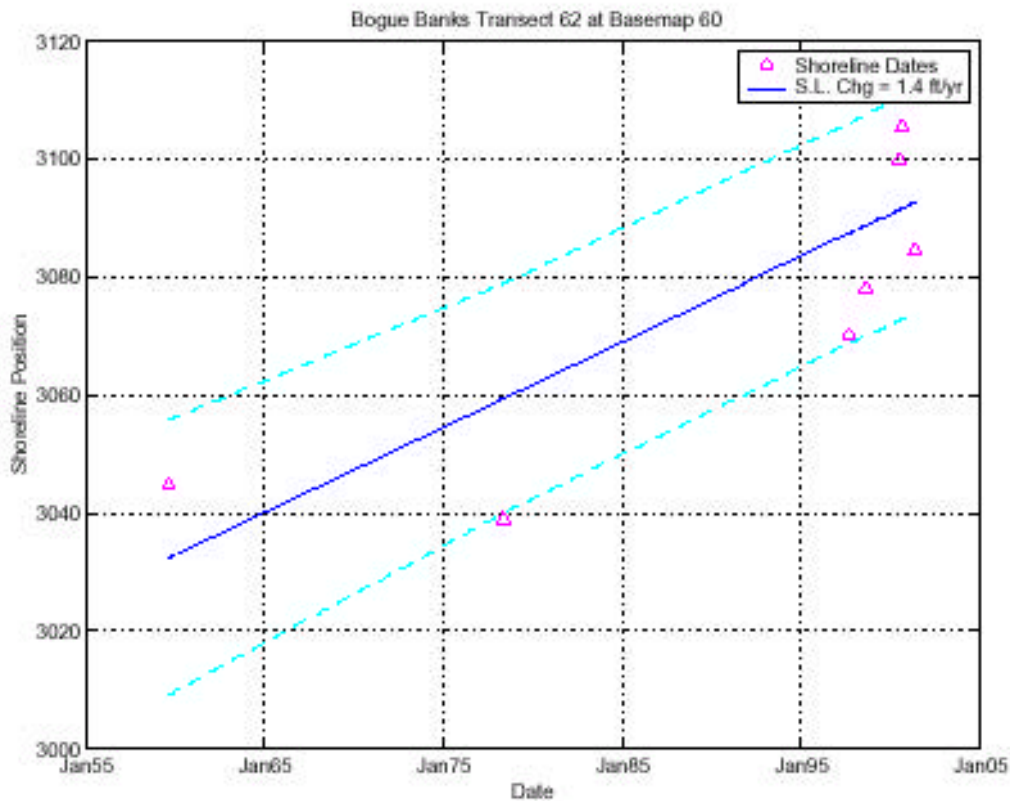


Figure C-13. Shoreline change rate calculated at single transect utilizing least-squares fit along Atlantic Beach.

The various data sources and methods confirm relatively low shoreline change over the past 5-20 years. Highest erosion rates (2 to 3 ft/yr) were found along Fort Macon State Park, Pine Knoll Shores, and Emerald Isle-East. Some reaches were found to be relatively stable (0-1 ft/yr), with only minor erosion (e.g., Emerald Isle-West, Salter Path, Indian Beach, and Atlantic Beach (background)), and some were accreting (Emerald Isle near Bogue Inlet and Atlantic Beach due to nourishment). Figure C-14 displays the shoreline change rates computed and utilized in the storm damage analysis.

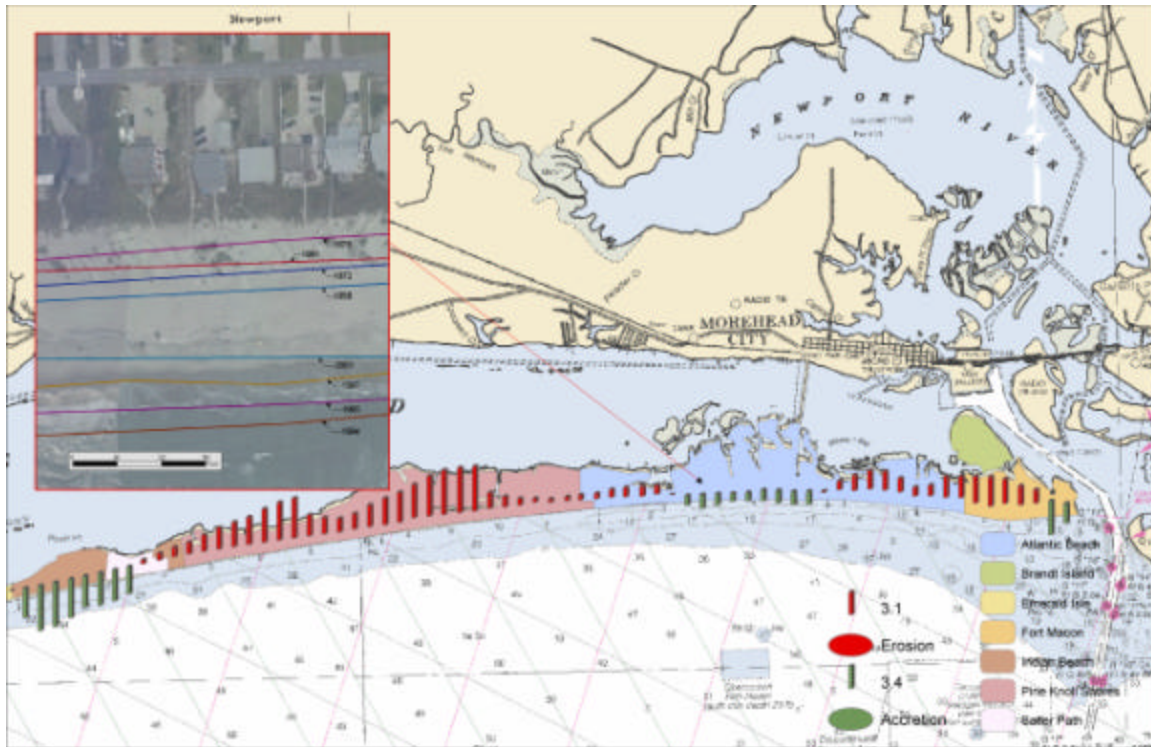


Figure C-14. Shoreline Change Rates (ft/yr) along Bogue Banks.

## Coastal Processes

Detailed investigations of the coastal processes associated with Bogue Banks were conducted through a combination of field data analysis and numerical modeling. Numerical simulations of wave transformations, tidal circulation, and sediment transport at Bogue Banks were conducted to provide a better understanding of existing conditions and to evaluate and compare alternatives to improve storm protection and beachfill stability in the vicinity of the study area. This approach provides an objective means for comparing the performance of alternatives.

### Water Levels

Water level fluctuations in the vicinity of Bogue Banks are primarily due to astronomical tides, storm surge, and wave-induced setup. Tidal datum relationships have been developed through field data collection at a water level gage located near Atlantic Beach. Storm surge and wave setup values were computed through numerical modeling efforts. The datum relationships were utilized to derive the MHW shoreline position and other key features along the shoreline. Time series of water levels for storm events were utilized to assess potential storm-induced damage due to inundation.

### *Tides*

The mean tidal range measured at the Triple S pier on Atlantic Beach by the National Oceanic and Atmospheric Administration (NOAA), National Ocean Service (NOS) is 3.7 feet with a mean spring tide range of 4.3 feet. Mean Low Water (MLW) and Mean High Water are  $-1.75$  ft NGVD and  $+2.21$  ft NGVD, respectively. The ocean tides are semidiurnal with almost equal high and low tides during successive tide cycles. Inside the inlet, the mean tide range is 3.0 feet at the State Port at the Duke University Marine Laboratory. Figure C-15 displays the tidal datum relationships developed for the Triple S Pier gage. The National Geodetic Vertical Datum 1929 (NGVD) was utilized to reference all elevation data throughout this report. An important relationship to note is that Mean High Water (MHW) is  $+2.21$  ft NGVD for the study area.

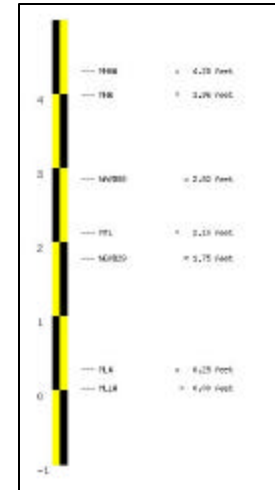


Figure C-15.

### *Storm Surge*

Tidal surges from storms (“Storm Surge”) add to the astronomically produced tides for a total still-water superelevation. Storm surge time series were developed for all significant hurricanes in the Atlantic Ocean from 1890 to 1990 as part of the Dredging Research Program (DRP-1-17, Scheffner, 1994). The ADCIRC model was used to update the hindcast to include recent hurricanes from 1990 to present, including named hurricanes Bertha, Fran, Dennis, Floyd, Bonnie and Irene. Time series of storms surge were coupled with astronomical tide data to serve as input to SBEACH for the storm damage assessment. Frequency-of-occurrence relationships were also developed for both storm surge and total water level.

### **DRP Storm Surge Database**

The tropical storm database, consisting of surge elevation and current hydrographs corresponding to selected WIS and nearshore stations along the east and Gulf coasts of the United States and Puerto Rico, was developed as part of the Dredging Research Program (Scheffner and others, 1994). The database was constructed by numerically simulating 134 historically based hurricanes that have impacted the eastern and Gulf coasts of the United States during the period 1886 to 1989. The source of data for these simulations is the National Oceanic and Atmospheric Administration’s National Hurricane Centers HURDAT (HURricane DATabase), described by Jarvinen, Neumann, and Davis (1988).

Figure C-16 displays the station locations where storm surge data are available in the vicinity of the study area. The offshore nodes correspond to Wave Information Study (WIS) stations with the corresponding nearshore station locations selected to provide most accurate storm surge values. Stations 405 and 406 were utilized for this study. Significant tropical events were extracted from the database based on storm surge values exceeding select threshold conditions. For the 100-plus years of coverage, 37 events were identified using a minimum storm surge threshold of 1 ft. In addition to the tropical storm surge database, extratropical storm surge values were calculated for the same locations for the dates from 1976 to 1993. Instead of the storm specific time series, a

continuous hourly time series was developed for the non-tropical season times of the year (September through March). Discrete event time series were extracted from the continuous time series using a combination of storm surge and wave height threshold criteria along with visual analysis to identify the start/stop times. There were 23 extratropical events identified over the 16-years of data coverage.

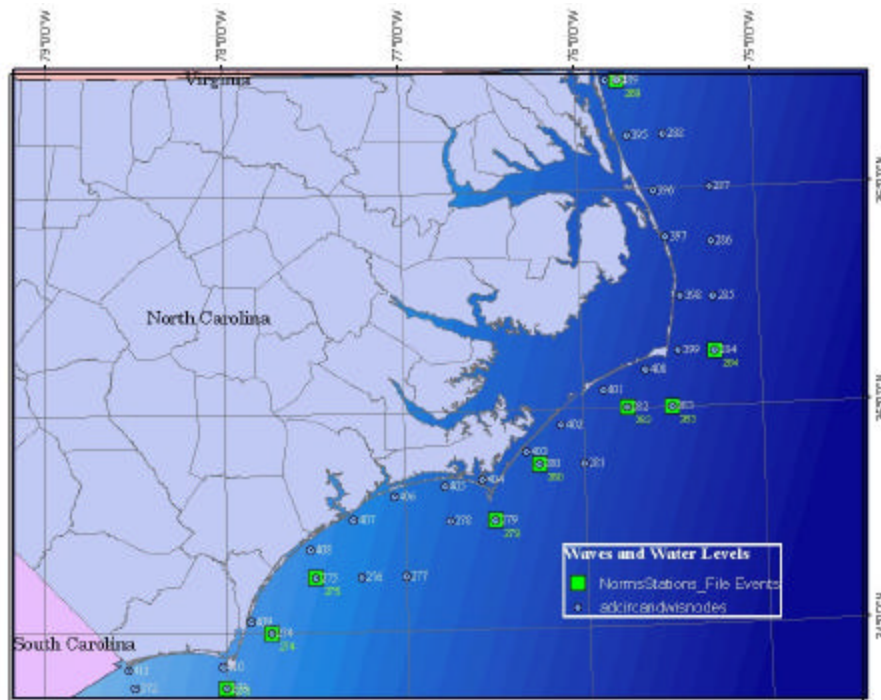


Figure C-16. Storm Surge Model Output Locations from DRP database.

## Recent Hurricane Storm Surge Modeling

The magnitude of the recent hurricanes to impact North Carolina since the mid-1990's required the storm surge database to be updated. Generation of hurricane storm surge values required two major tasks, each using a numerical model. In the first task, hurricane-induced wind and atmospheric pressure fields are generated to replicate those hurricanes (Bertha, Fran, Dennis, Floyd, Bonnie and Irene) that have impacted the study area. Using these wind and pressure fields, storm-surge events are simulated in the second task using a long-wave hydrodynamic model to obtain water-surface levels.

### Wind and Atmospheric Pressure Model

The Planetary Boundary Layer (PBL) wind field model was selected for simulating hurricane-generated wind and atmospheric pressure fields. The PBL hurricane wind model requires a series of "snapshots" for input consisting of a set of meteorological



storm parameters defining the storm at various stages in its development or at particular times during its life. These parameters include latitude and longitude of the storm's eye, track direction and forward speed measured at the eye, radius to maximum winds, central and peripheral atmospheric pressures, and an estimate of the geostrophic wind speed and direction. Some meteorological storm parameters were obtained from the hurricane database developed by the National Oceanic and Atmospheric Administration (NOAA)'s National Hurricane Center (NHC). This database summarizes all hurricanes and tropical storms that occurred in the North Atlantic Ocean over the 104-year period from 1886 through 1989. Information contained in this database is provided at 0000, 0600, 1200, and 1800 hr Greenwich Mean Time (GMT) and includes latitude and longitude of the storm, central pressure, and maximum wind speed. Radius to maximum winds is approximated using a function that incorporates the maximum wind speed and atmospheric pressure anomaly. Track directions and forward speeds required by the PBL model are approximated hourly, using cubic spline interpolation technique, from the storm's 6 hr latitudinal and longitudinal positions provided in the database.

Hourly wind and atmospheric pressure fields are computed for each snapshot and interpolated using a nonlinear blending algorithm that produces a smooth transition from one snapshot to the next. Hourly wind and pressure fields are then interpolated from the PBL grid onto the hydrodynamic grid and subsequently stored for use by the hydrodynamic model.

### Storm Surge Model

The ADvanced CIRCulation (ADCIRC) numerical model was chosen for simulating the long-wave hydrodynamic processes in the study area. Imposing the wind and atmospheric pressure fields computed with the PBL model, the ADCIRC model can accurately replicate hurricane-induced storm-surge levels. The ADCIRC model was developed in the USACE Dredging Research Program (DRP) as a family of two- and three-dimensional finite element-based models (Luettich, Westerink, and Scheffner 1992; Westerink et al. 1992).

ADCIRC is a finite element long-wave hydrodynamic model applied for simulating water-surface elevation and circulation over the entire model domain as a function of tidal forcing, freshwater inflow, wave stress forcing, and wind forcing. The finite element formulation has the advantage of great flexibility in resolution over the calculation domain. Coarse resolution can be specified in areas distant from the local region of interest, and fine resolution can be specified locally to meet project requirements. For instance, channels and structures can be defined for accurate calculation of flow through and around them.

The basis for the model bathymetry was an ADCIRC grid developed by the Corps of Engineers Waterways Experimental Station for the North Atlantic Ocean and the East Coast of the United States. The grid was modified to include only the areas of interest for

this project. A finite element mesh was developed for the modeled area, as shown in Figure C-17.

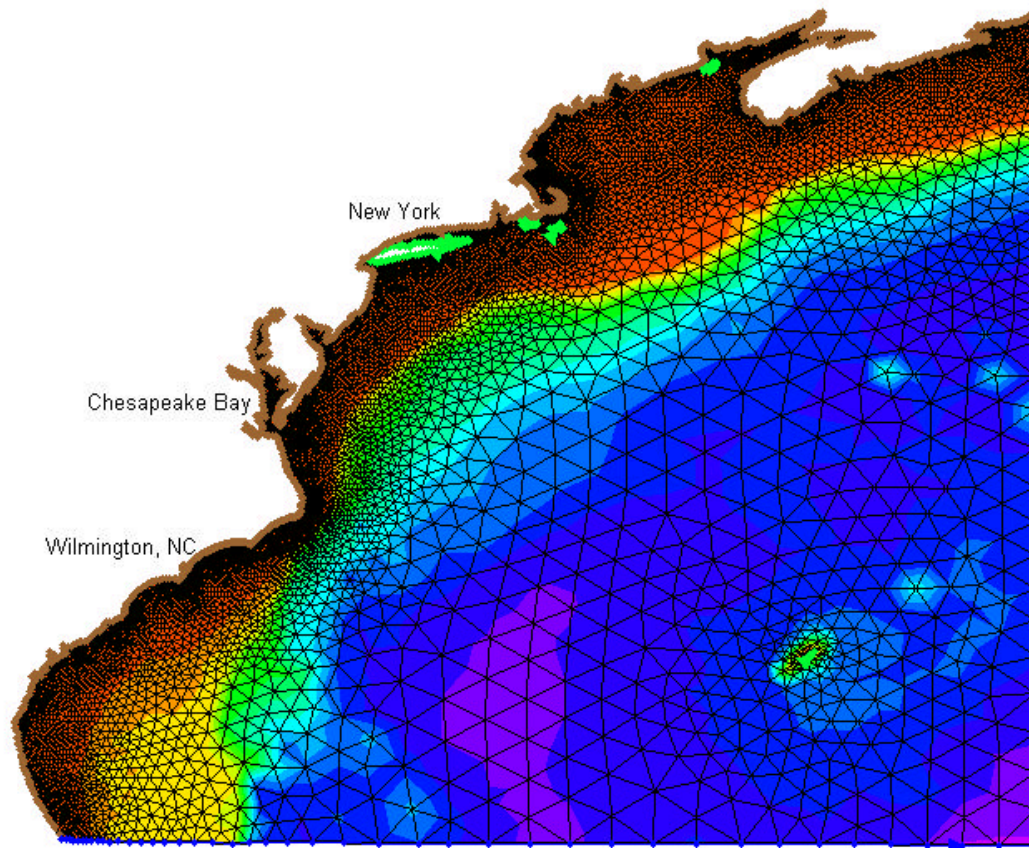


Figure C-17. ADCIRC Model Domain.

The recent storms (Bertha, Fran, Dennis, Floyd, Bonnie and Irene) were simulated with the storm-surge model. Starting and ending times of each storm simulation corresponds to the first and last entry contained in the NHC database for that particular storm. Furthermore, each storm-surge simulation began with the hurricane residing at its initial position listed in the database and concluded at its ending position. Thus, each simulation began when the hurricane was far away from the study area. For all hurricanes, a temporal “ramp” was used to slowly increase, over a 1-day period, wind stresses and pressure gradients from zero to their measured intensity. Using this ramp eliminates spurious modes of oscillation caused by suddenly imposing full-force winds and pressure gradients on the flow field.

All storm-surge simulations were performed independently of tidal action, eliminating the task of extracting surge levels from a time-series of combined tide-and surge-induced water-surface elevations. Figure C-18 displays surge values at select output locations for the Hurricane Fran simulation. Astronomical tide conditions were generated for each event using NOS derived tidal constituents at Triple S Pier and combined with storm-

surge values to produce a Total Water Level (TWL) time series. The TWL served as input into SBEACH for storm-induced beach profile response modeling.

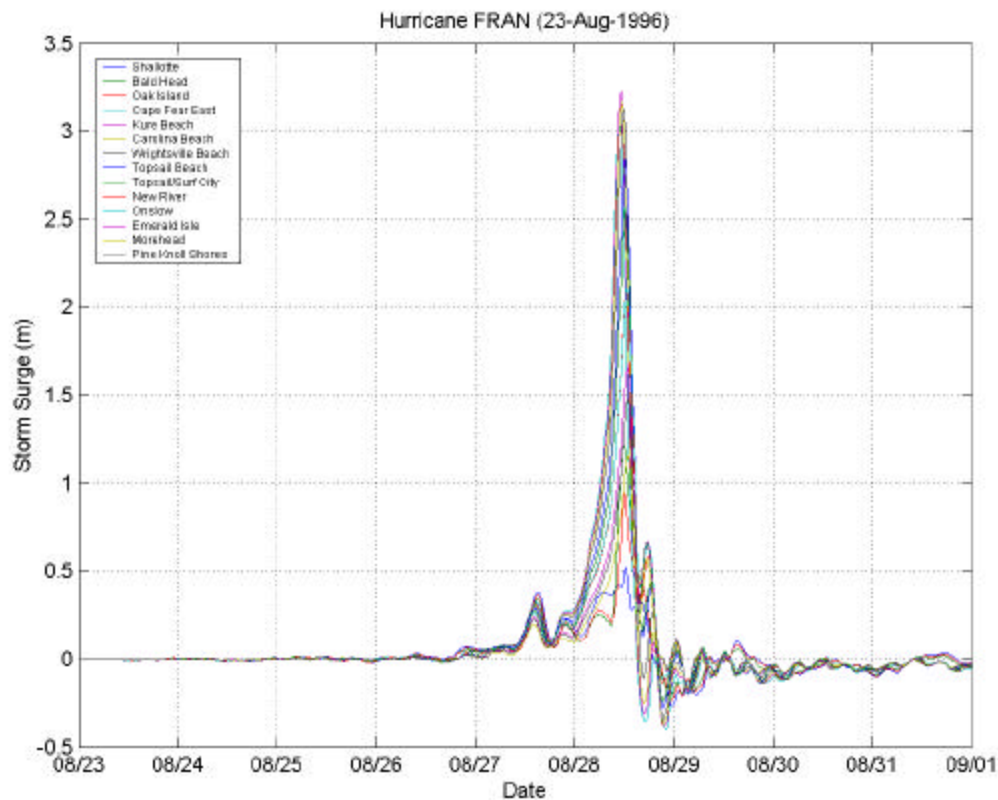


Figure C-18. ADCIRC Model Output for Hurricane Fran Simulation.

Storm-surge elevations computed in this task can be considered as approximations of the historical events. Although the frequencies associated with their maximum surge may be considered relatively accurate, the value of the peak surge may not correspond to historically observed surge elevations. The hydrographs should therefore not be considered hindcast of the historical events due to the fact that the hurricane parameters estimated from the storm database are only approximate; all information necessary to numerically simulate each event is unknown and has not been calibrated. For example, values of central pressure, radius to maximum winds, and far-field pressure are not known and were estimated from available data or observations. Because little data exist for the earlier storms, a consistent approach for selecting storm parameters was developed. This approach may not produce an accurate surge elevation for a particular event; however, it is felt that the final full population of storm data from which storm statistics are computed is representative of the range of historical events and should produce reliable and accurate hurricane stage-frequency relationships.



## Waves

Wind waves and swell that are generated by local or distant storms are defined as short waves. These surface gravity waves have periods less than about 25 sec. Quantitative information about short waves in the vicinity of Bogue Banks is required in this study for determining storm-induced beach profile responses, simulating wave-induced structural damages, and estimating longshore sediment transport.

Wave heights, frequencies, and directions have been evaluated for this area using various methods. The Wave Information Study (WIS) hindcast with dates from 1976-1995 and recent hindcast from 1995 to 1999 were the main sources to characterize expected long term wave conditions and serve as input to longshore sediment transport analyses. Figure C-19 shows WIS Station locations in the Mid-Atlantic. Station 46 was utilized to characterize offshore wave conditions in the study area. To construct the wave climate, percent occurrence tables (broken down by height, period, and direction) were calculated for the entire hindcast. The Bogue Banks wave climate is illustrated in Figure C-20 as a wave rose with directional resolution of 22.25 deg. Figure C-21 also shows overall distributions by height, period, and direction in a histogram format. The average annual wave height is approximately 1 meter. Wave heights exceeding 1 meter only exist approximately 25 percent of the time. Although the largest percentage of waves are shown to be from the east, wave heights greater than 8 ft are shown to originate from east to southwest, as shown in Figure C-22. Improvements are being made to the WISWAVE model, including improved bathymetry and wind fields. It is expected that ten years of hourly hindcast wave data (1990-1999) will be available Spring 2003 for the Atlantic Coast. Such data are expected to greatly improve confidence in sediment transport magnitude estimates.

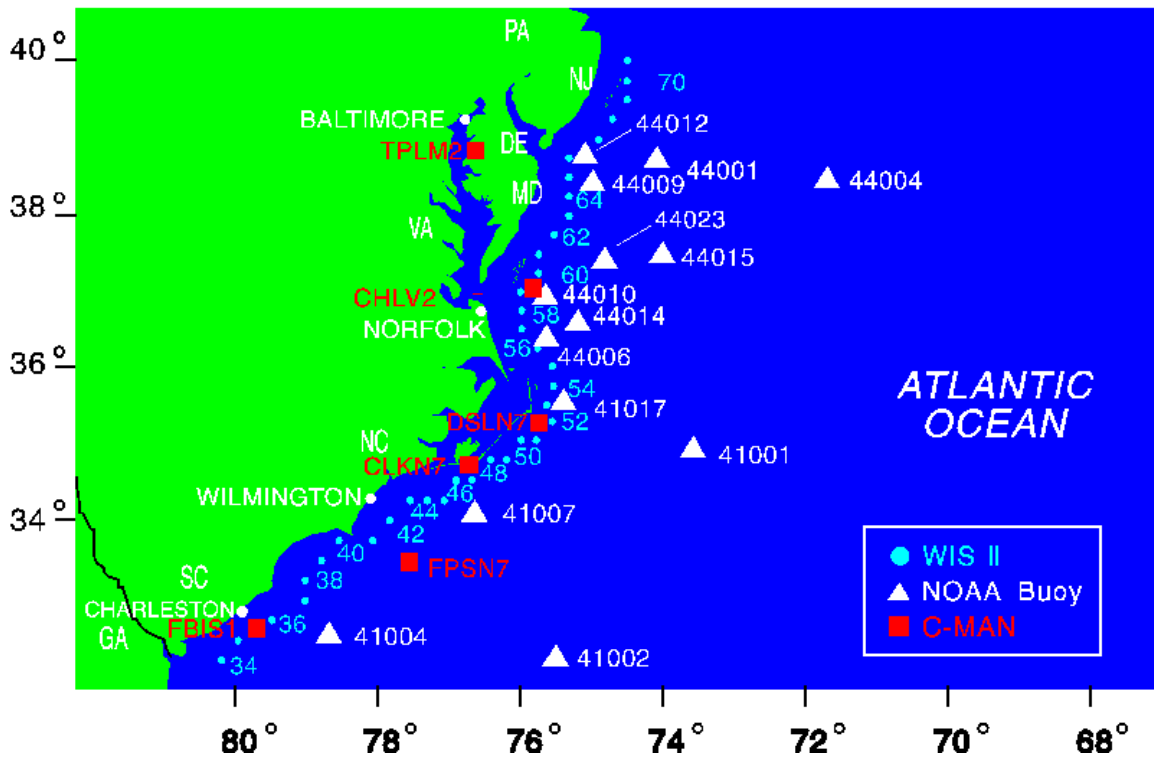


Figure C-19. WIS Station Locations.

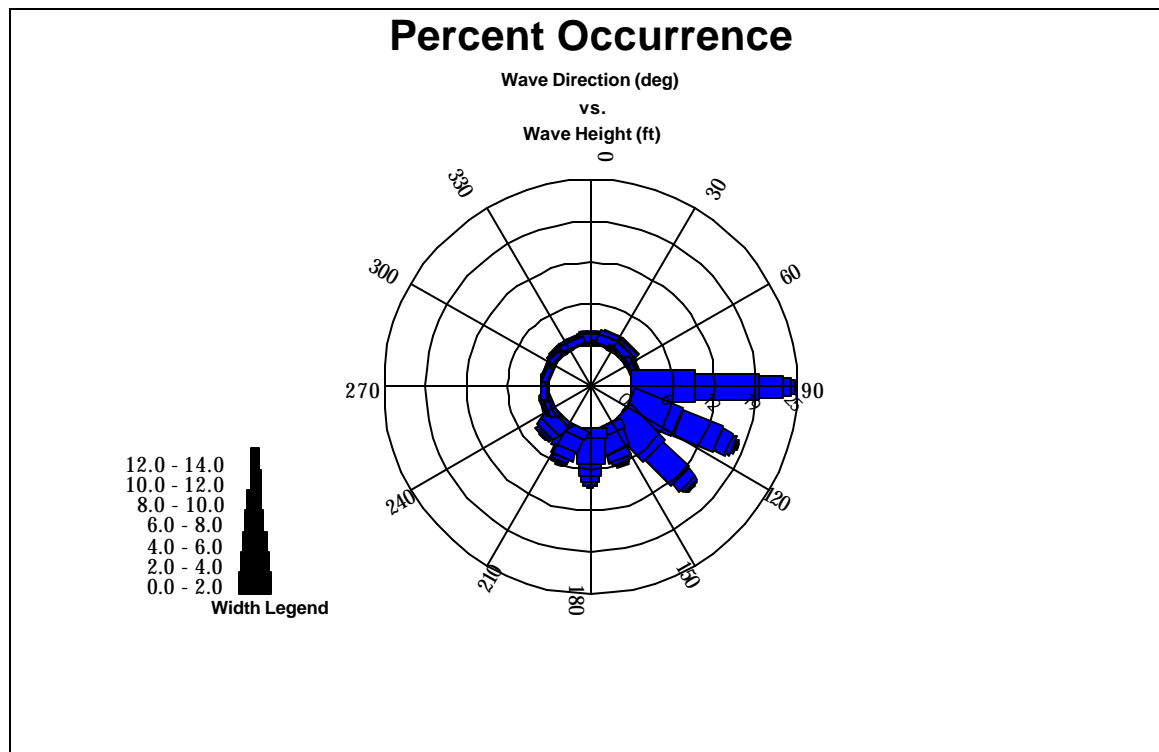


Figure C-20. Wave Rose for WIS Station 46 (1976-1995) Hindcast.

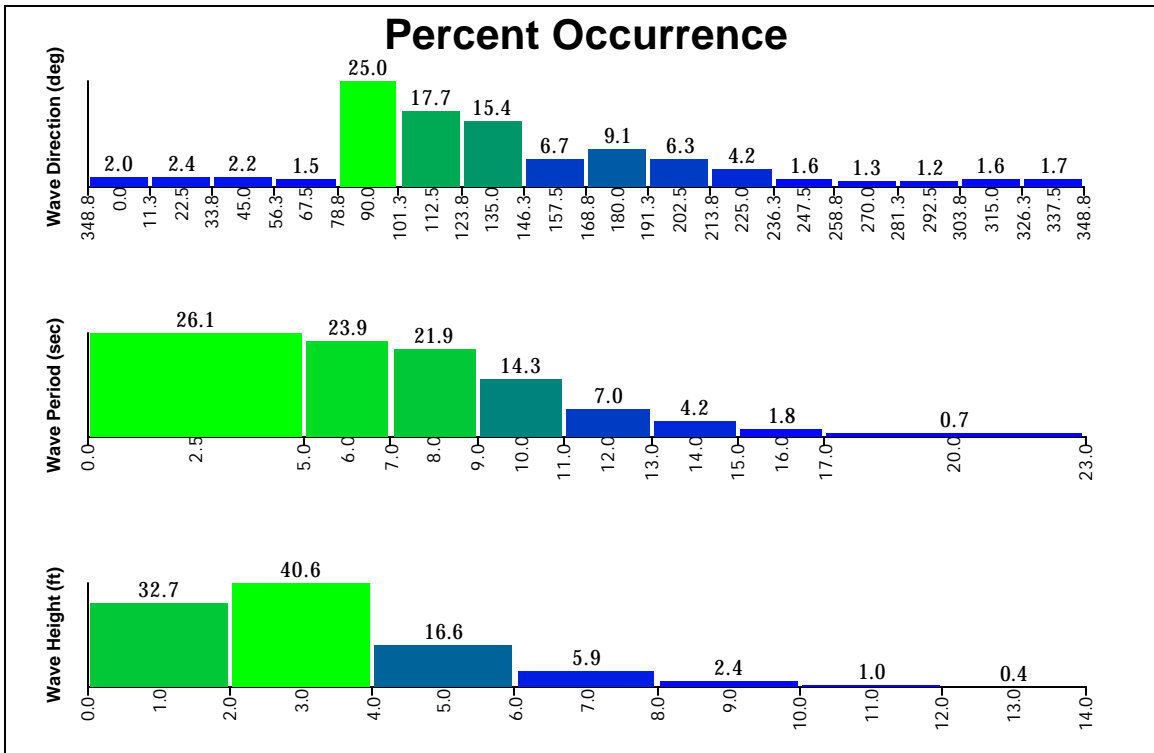
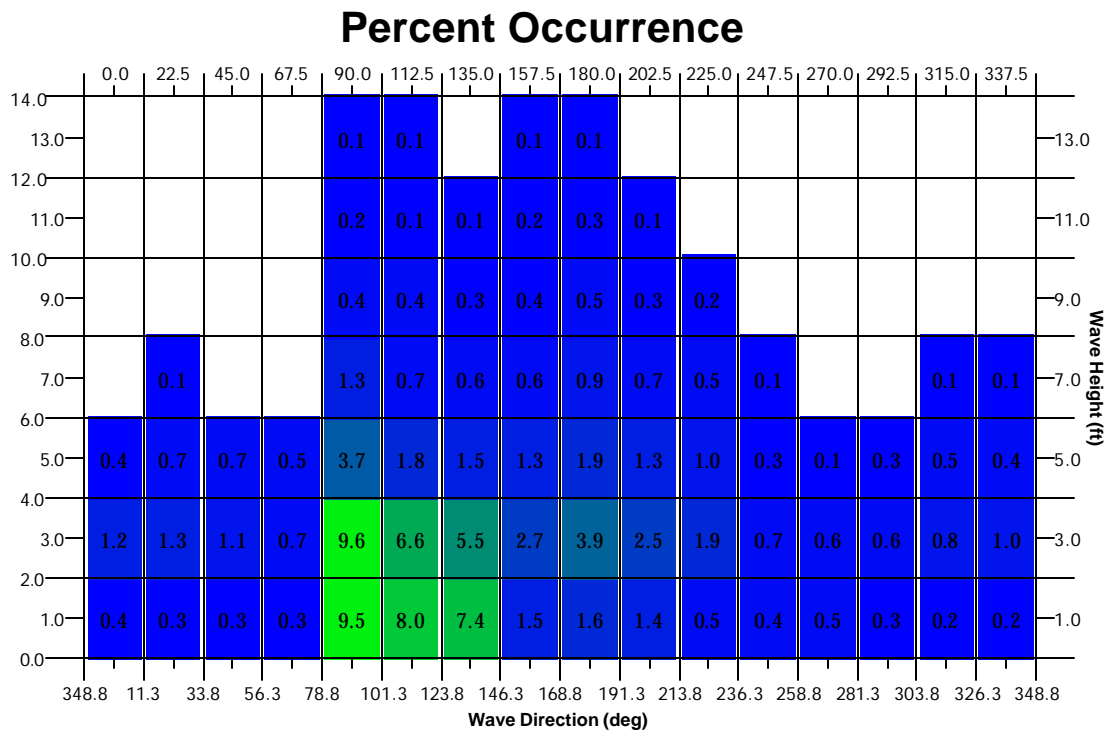


Figure C-21. Wave Histogram for WIS Station 46 (1976 to 1995) Hindcast.



In addition to the long-term wave data, significant events were identified for input to the storm damage analysis. Time series of wave conditions for the extratropical and tropical events corresponding to those discussed in the water level analysis were developed using a combination of WIS data and numerical modeling. Extratropical storm events were extracted from the updated WIS hindcast (1976-1995). Tropical storm events (hurricanes) were included in the updated and recent WIS hindcast efforts (1976-1995, 1995-1999); however, the original WIS hindcast (1956-1975) did not include hurricanes. Therefore, in order to provide corresponding wave conditions to previously identified significant hurricanes, Wilmington District personnel utilized an empirical hurricane wave model to generate wave time series. Figure C-23 displays a typical time series of The combined time series of water levels and wave conditions (height, period, and direction) will serve as input to SBEACH for the storm damage analysis.

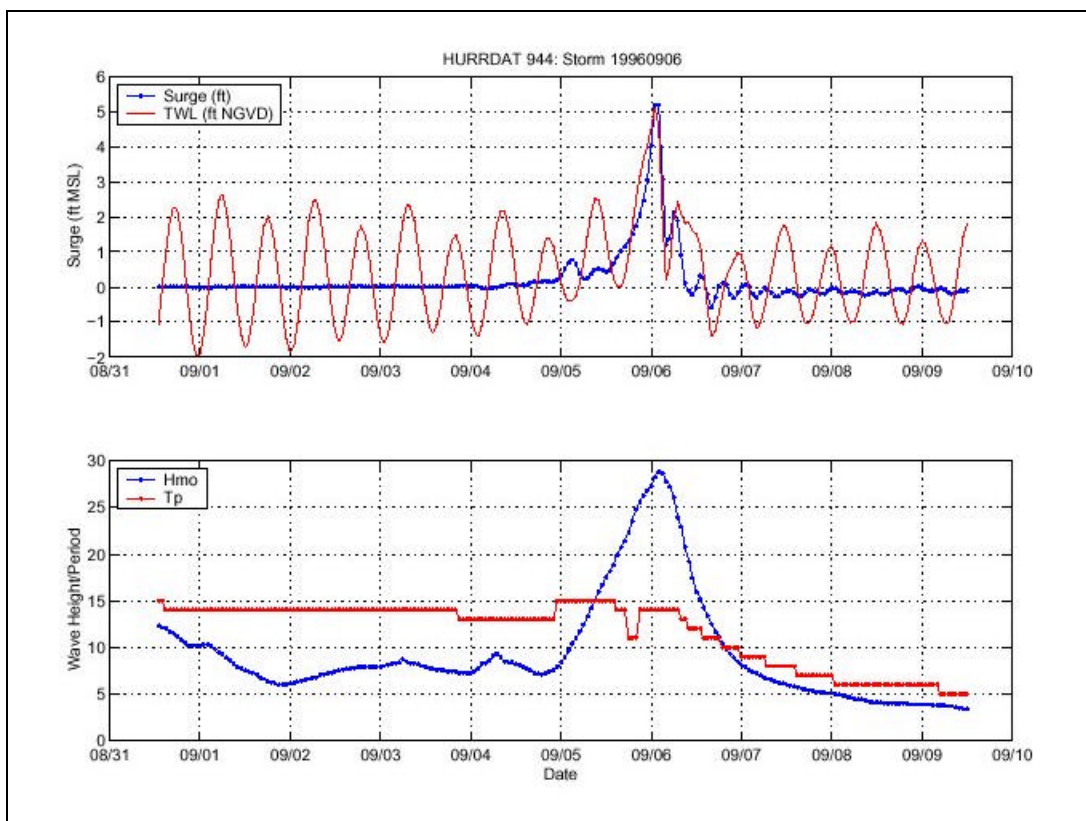


Figure C-23. Example Storm Time Series for Hurricane Event.

### Sediment Transport

Several studies of potential longshore transport have been previously conducted for this area. The results of the studies are widely scattered and indicate that the magnitudes and direction of transport are solely a function of which wave database was used. Net longshore transport rates are low along Bogue Banks as evidenced by small shoreline change rates and no large accumulations of sand at the end of the cell (western Emerald Isle). The numerical model GENESIS was utilized to compute potential longshore sediment transport rates for existing shoreline conditions.

The model was setup with the origin in the vicinity of Fort Macon in order for the jetty to serve as the eastern-most lateral boundary condition. Model grid azimuth was 262.16 deg north, representative of the average shoreline angle throughout the Island for recent conditions. The model extended 119,250 ft through Emerald Isle near Bogue Inlet where historical shoreline change rates were minimal and a pinned boundary condition was applied. The model was configured using effective grain size and active profile depths representative of existing conditions. Additionally, longshore sediment transport calibration coefficients were established through a calibration and verification effort. Utilizing the April 2001 shoreline and recent WIS hindcast wave data, potential longshore transport rates were determined as shown in Figure C-24. The gradients in transport correlate well to known areas of historical shoreline change. The GENESIS model was not used to evaluate explicit beachfill alternatives, but used primarily to identify potential transport rates that served as input into a more simplified beachfill planform evolution model.

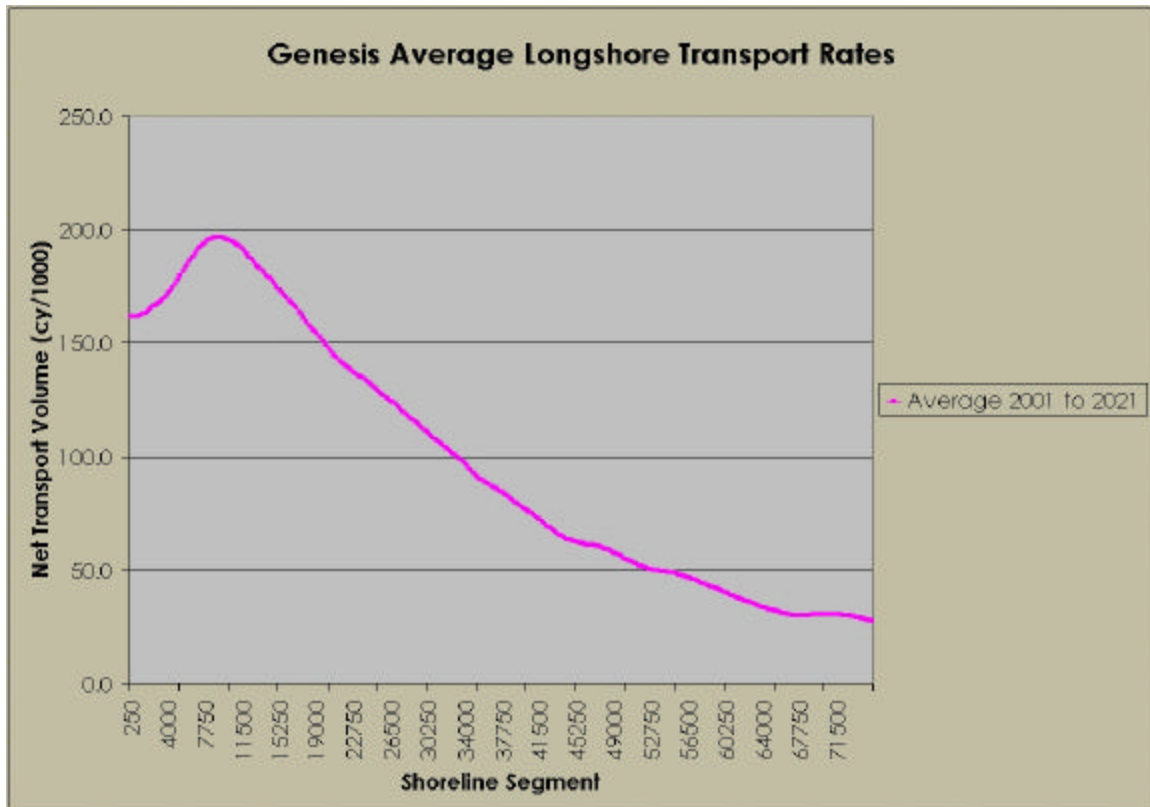


Figure C-24. Potential Net Longshore Transport (yd<sup>3</sup>/yr) along Bogue Banks throughout Study Area.

## Beachfill Evolution

Beachfill or beach disposal planform evolution was evaluated for both recent local nourishment activities and potential study alternatives. In general, when sand is placed in conjunction with a beach nourishment or beach disposal project, this project represents an “anomaly” to the shoreline planform and the natural processes will tend to smooth out

this anomaly. The Planform Evolution Model within the Beach Fill Module developed by the Engineering Research and Development Center's Coastal and Hydraulics Laboratory was used to simulate beachfill planform evolution. The model is based on Dean's model developed for thirty-year shoreline projections in the vicinity of beach nourishment projects (Dean, 1989). The model is a rapidly applied model that considers both background erosion rate which is the normal rate in areas that have not been nourished and the shoreline retreat component due to "spreading out" losses from the beach nourishment project. The model also requires input of sediment characteristics and effective wave conditions for longshore transport. The effective wave conditions consist of a single set of wave parameters that result in the same net longshore transport as determined in the GENESIS analysis. Model output consists of shoreline positions at user-specified time intervals along with sediment transport rates. Post-processing of the output was performed to compute shoreline change rates associated with the nourishment/disposal project.

### **Local Nourishment Activities**

The first phase of the locally funded (Carteret County) beach nourishment project resulted in approximately 1.73 million cubic yards being placed from Pine Knoll Shores to Indian Beach (39,200 ft). The berm-only project averaged less than 45 cubic yards per foot, a very small beachfill. Assuming an active profile of 25 ft would result in an increased berm width of less than 50 ft, not accounting for losses.

The beachfill conditions were specified in the Beach Fill Module along with other necessary parameters and simulations of shoreline evolution were performed through the anticipated construction date (November 2003) and to the anticipated economic life of the project. The resulting shoreline positions were post-processed to compute with-project shoreline change rates. The anticipated berm widths at the base year of construction were incorporated into existing beach profile conditions and were utilized as base conditions for the storm damage analysis.

### **Study Alternatives**

Similar analyses were conducted for the Base Disposal and Recommended 933 Plans. Figure C-25 displays the Beach Fill Module results for the Section 933 Recommended Plan. While it is common for short beachfills to have larger shoreline change rates than the background erosion rate, the length of the Recommended Plan results in a fairly stable planform with relatively uniform shoreline change rates on the order of -2 ft/year. The with-project shoreline change rates exceed background rates in some locations such as Atlantic Beach, however the distribution of the fill material due to spreading losses results in lower erosion rates in the vicinity of Pine Knoll Shores. The with-project shoreline change rates were utilized as input into the economics analysis (GRANDUC) to compute potential damages, part of which is land loss.

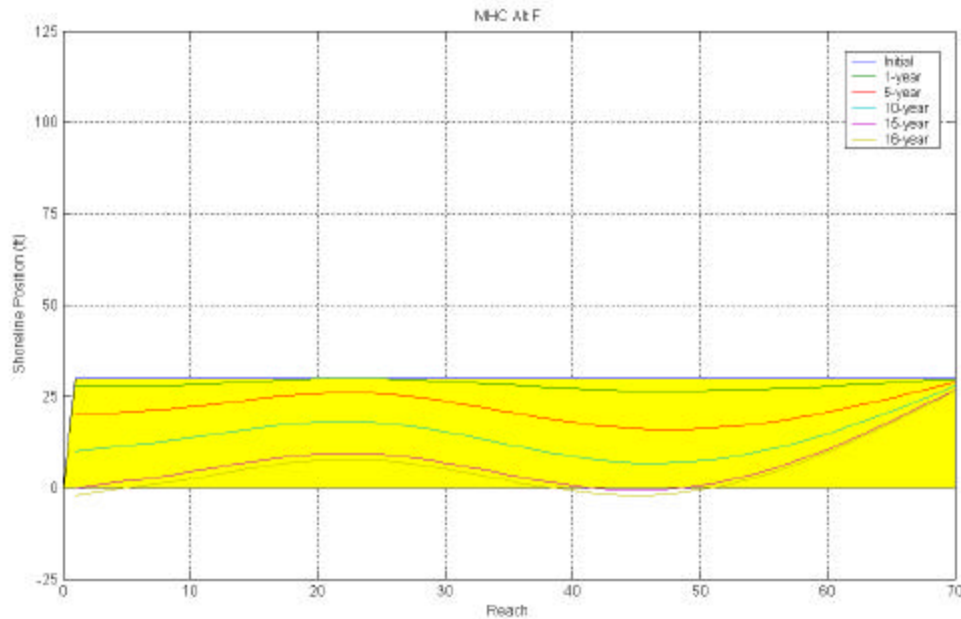


Figure C-25. Beach Fill Module Results for the Section 933 Recommended Plan.

## Storm Damage Analysis

The economic analysis of storm damages for the range of beach conditions throughout the study area requires development of frequency-of-occurrence relationships for water levels, wave conditions, and erosion distances. In order to account for risks and uncertainties inherent to the analysis procedure, methods were selected to express storm damages in a probabilistic manner. In other words, the results were required in the form of erosion distance or water levels versus frequency-of-occurrence relationships.

A suite of storm events was used to assess the performance of alternatives in reducing potential damages due to erosion, wave attack, and inundation. Profiles were developed to characterize the alternatives dimensions and serve as input to the storm damage calculations. The numerical model SBEACH (Storm Induced BEAch CHange) was used to further transform the waves into the nearshore across proposed alternatives and simulate beach profile change, including the formation and movement of major morphological features such as longshore bars, troughs, and berms, under varying storm waves and water levels. In addition to computing beach profile response, the wave transformation algorithms within SBEACH were utilized to characterize incident wave conditions and total water levels (including wave setup) for each storm. Key response parameters from the SBEACH output were extracted for each storm and used to generate frequency of occurrence relationships using the Empirical Simulation Technique (EST) model. The frequency of occurrence relationships for erosion distances and other parameters serve as input to the GRANDUC model for computation of storm damages.

### **SBEACH Analysis**

The computer model SBEACH was used to estimate erosion expected to occur during various storm events for the without project condition and the with-project template considered. Additionally, the wave transformation routines in SBEACH provide transformed wave conditions and wave-induced setup values for each simulation. SBEACH simulations were performed for the suite of storm events against the range of beach profile conditions. Input data for the SBEACH model included onshore and offshore survey data, storm water elevations, and storm wave heights and periods as discussed previously. The results from SBEACH modeling (i.e., “response parameters”) that are used in storm damage calculations include: distances from the baseline to the point where select vertical feet of erosion occurs (i.e., 0.5, 2, 4 ft), the ground elevations at these erosion points, erosion volumes, maximum dune elevation, maximum wave height at dune crest, and maximum total water level (including wave setup).

### **Alternative Profiles**

In addition to the representative beach profile conditions developed for existing conditions, a range of with-project alternative profiles were developed. Since the existing dune conditions typically have elevations in excess of what is commonly designed for a storm protection project, all alternatives consisted of berm only plans. Alternative profiles were developed with berm widths ranging from 25 ft to 125 ft at 25 ft intervals for each representative profile. The berm elevation was set at +7 ft NGVD as representative of natural berm elevation found along Bogue Banks. The berm tied into the existing dune conditions at +7 ft NGVD and extended seaward for the defined berm width (i.e., 100 ft) and then sloped seaward to Mean Tide Level (MTL) at a 1V:25H slope that was found to be representative of average nearshore conditions along Bogue Banks. The offset at MTL was maintained along the offshore component of the profile to depth of closure. Figure C-26 displays the existing beach profile conditions along with the range of alternative berm conditions.



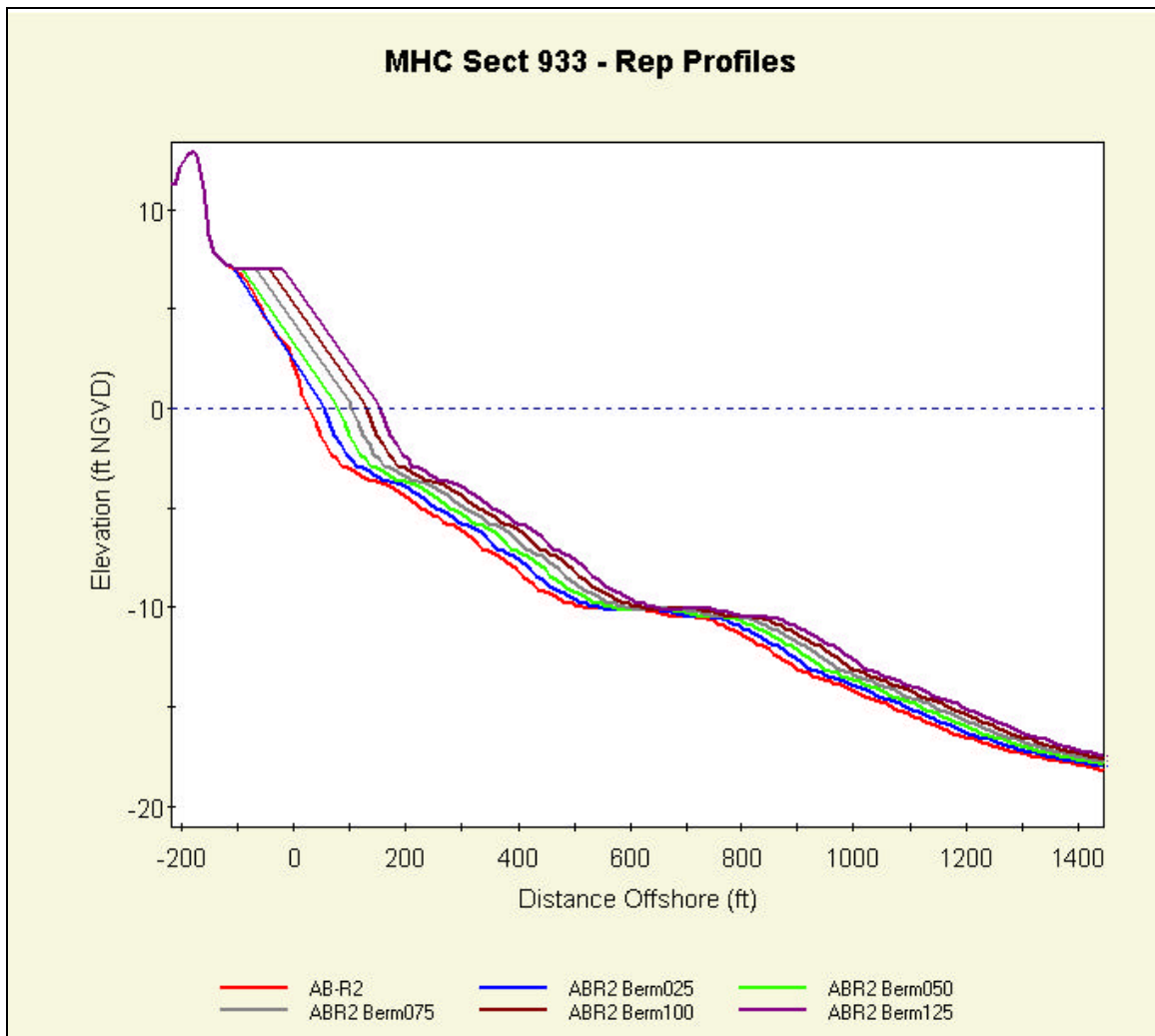


Figure C-26. Alternative Profile Conditions.

### Storm Response Parameters

Simulation of storm events yields various responses. The parameters that directly impact storm damage include nearshore wave height, total water level, storm surge, wave setup, runup, erosion distances (0.5, 2.0, and 4.0 ft), dune lowering, dune recession, and volumetric changes above MHW. Select parameters were extracted from the SBEACH analysis and used to characterize the performance of the alternatives against each storm event. Figure C-27 displays SBEACH output for an extreme event for existing conditions at Atlantic Beach. The plots display initial and final profile conditions, along with maximum water elevations (includes storm surge and wave setup) and maximum wave height observed throughout the simulation. The profile response over the simulation, as indicated by the difference between initial and final profiles, provides an indicator of the severity of the storm on potential offshore losses.

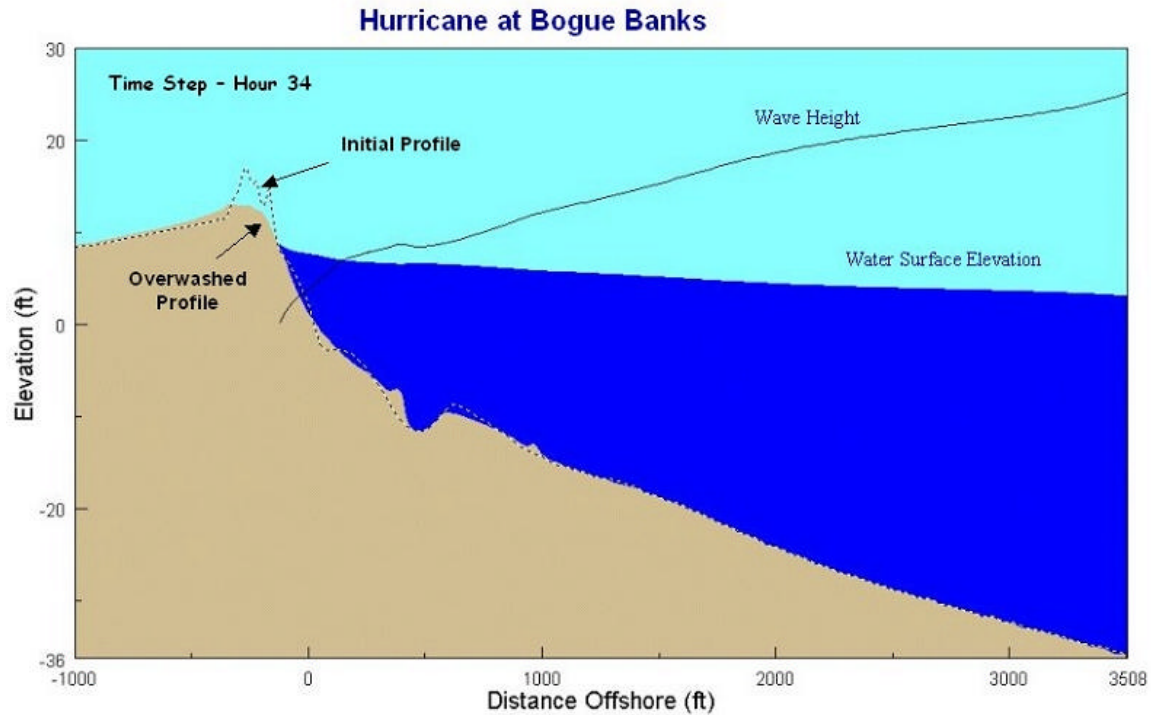


Figure C-27. SBEACH Profile Response Parameters

## EST Analysis

The EST (Empirical Simulation Technique, Scheffner and Borgman, 1992) utilizes observed and computed parameters associated with site-specific historical events as a basis for developing multiple life-cycle simulations of storm activity and the effects associated with each simulated event. The first step in EST is an analysis of historical events that have impacted a specific locale. The storm events analyzed for the Bogue Banks area have been described previously. The storm events simulated were parameterized to define the characteristics of each event and the impacts of that event. Parameters that define the event are referred to as input vectors. Response vectors define storm-related impacts such as total water level and shoreline/dune erosion. These input and response vectors were then used as a basis for generating life-cycle simulations of storm-event activity with corresponding impacts. Results of the multiple repetitions were post-processed to generate frequency-of-occurrence relationships. Because multiple life-cycle scenarios were simulated through the EST, mean values frequencies (or return periods) were computed along with error estimates about the mean.

### Frequency Distributions

The frequency of occurrence relationships for Total Water Level and the 0.5 Erosion Distance are shown in Figures C-28 and C-29 for the Atlantic Beach existing conditions. These relationships were developed for all profile conditions and all response parameters. Select return periods were extracted from each frequency-of-occurrence relationship and provided as input to the GRANDUC model used to calculate storm-induced damages.

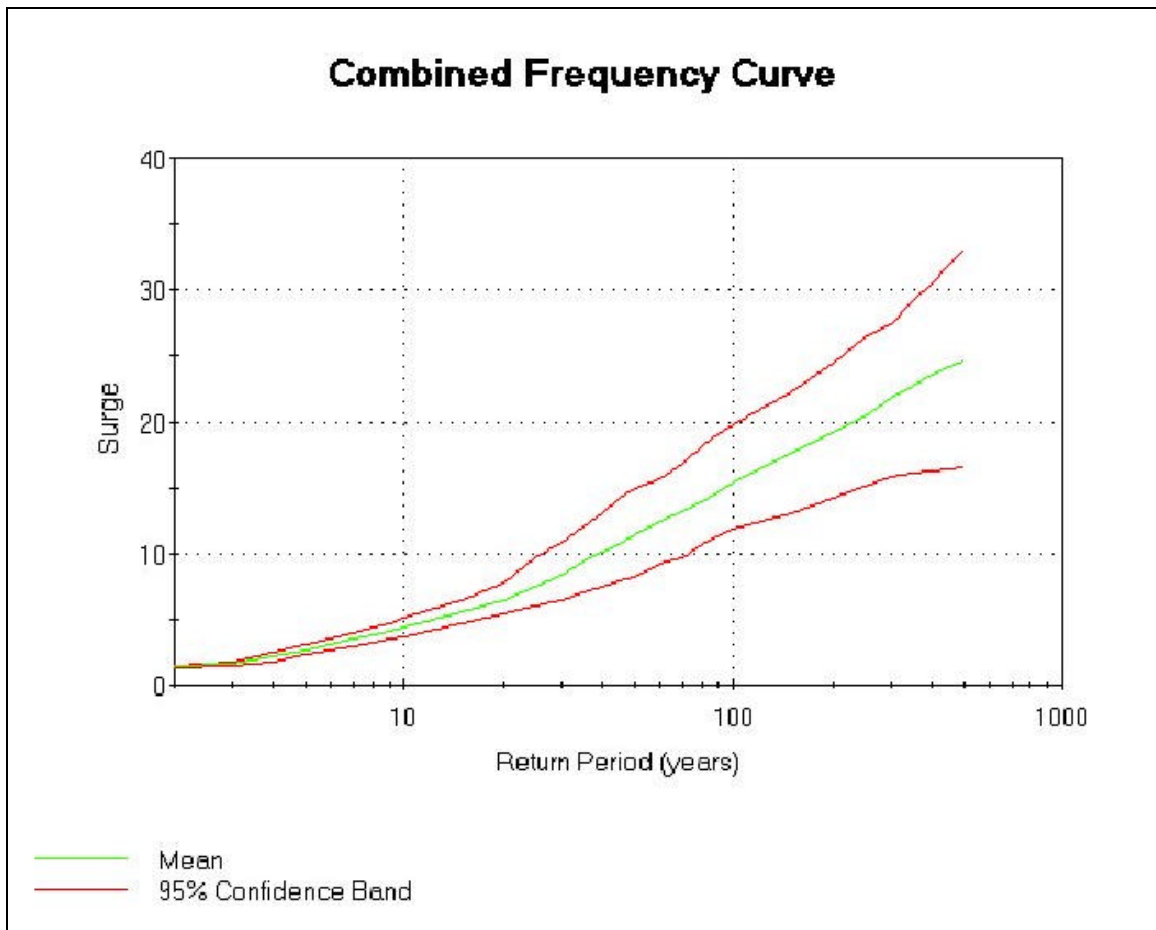


Figure C-28. Frequency-of-Occurrence Relationships for Surge Along Bigue Banks.

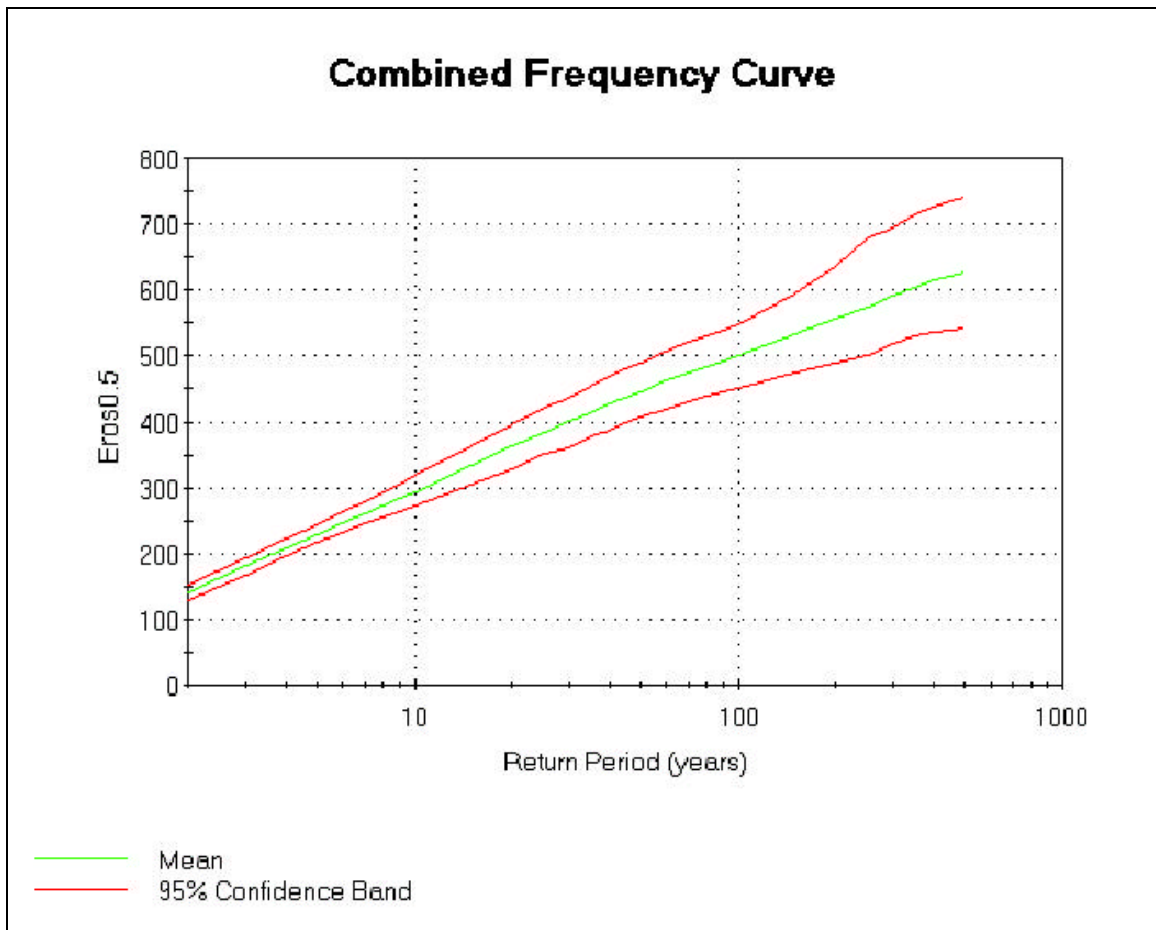


Figure C-29. Frequency-of-Occurrence Relationships for Erosion Distance Indicator (0.5 ft) Along Bogue Banks.

MOREHEAD CITY HARBOR  
CARTERET COUNTY, NORTH CAROLINA  
SECTION 933  
EVALUATION REPORT

APPENDIX D

**ECONOMIC ANALYSIS**



## **APPENDIX D ECONOMIC ANALYSIS**

### **Introduction**

The purpose of this study is to investigate the beneficial placement of dredged maintenance material from the authorized pump out of Brandt Island confined dike disposal area, and the maintenance dredging of the Morehead City Harbor navigation project, both of which are scheduled for the Winter of 2003-2004. This study analyzes the deposition of this dredged material along a portion of Bogue Banks beaches beyond the Corps' Base Disposal Plan, referred to as the "Section 933 Study Area." The Section 933 Study Area must be assessed for hurricane and storm damage reduction needs. This study also develops a plan of protection for this area based on the economic, engineering, and environmental feasibility, as well as the requests of the local sponsor.

Located on the central North Carolina coast in Carteret County, the beach communities of Atlantic Beach, Pine Knoll Shores, Indian Beach, and Salter Path, and Fort Macon State Park are collectively referred to as Bogue Banks. Fort Macon and Atlantic Beach fall within the normal Base Disposal Area for disposal operations associated with the maintenance of Morehead City Harbor. Disposal operations in 1986 and 1994 have kept the majority of this shoreline in a satisfactory condition. A much more vulnerable situation exists over the shoreline of the resort communities of Pine Knoll Shores, Indian Beach, and Salter Path. Hurricanes, subtropical storms, progressive erosion, and increasing development over the last several years have raised the potential for damages considerably over this 7.2-mile reach. Numerous structures in this area are highly vulnerable to damage by storm action due to the eroded dune system and loss of natural protection. It is for Pine Knoll Shores, Indian Beach, and Salter Path that this Section 933 economic analysis of the beneficial placement of dredged material from the maintenance of Morehead City Harbor channels is evaluated. Emerald Isle is experiencing similar problems but was not included in the Section 933 evaluation because of volume limitations of the disposal material and increasing distances associated with its transport.

Based on analyses conducted during this study, the most practicable beneficial placement of dredged material for hurricane and storm damage reduction is a beach berm (with transitions) along Pine Knoll Shores and Indian Beach and Salter Path. This is the reach that Carteret County, the non-Federal sponsor, requested to be studied and, as this appendix demonstrates, where a Section 933 project has been determined to be economically justified.

## **The Study Area.**

Carteret County is located on the central North Carolina coast. Bogue Banks is a 25.4 miles long south-facing barrier island located on the low-energy limb of the Cape Lookout foreland within Carteret County. It is oriented in an approximate east to west direction between Beaufort and Bogue Inlets, located on the east and west terminuses of the island, respectively. The island is bound to the north by Bogue Sound, a relatively shallow water body through which the Atlantic Intracoastal Waterway passes.

Fort Macon State Park occupies the eastern 1.4 miles of the island. Political subdivisions on the rest of the island include, from east to west: the Town of Atlantic Beach, the Town of Pine Knoll Shores, an unincorporated area known as Salter Path, the Town of Indian Beach, and the Town of Emerald Isle. Hereafter in this analysis, for simplicity, the unincorporated area of Salter Path is included in all references to Indian Beach. The width of the upland portions of the island (the landmass above mean high water) varies from a minimum of approximately 800 feet to a maximum of over 4,000 feet. The narrowest part of the island, which ranges in width from 800 feet to 1,000 feet, is located along the easternmost 2.8 miles of Emerald Isle. The widest part of the island, which measures over 4,000 feet, is located on the westernmost 5.1 miles of the island, also within the corporate limits of Emerald Isle.

A maritime forest area is located on the sound side of Bogue Banks between the east portion of Indian Beach through Pine Knoll Shores. This reach of the island includes the Theodore Roosevelt Natural Area on the sound side, which is the only portion of Bogue Banks included in the Coastal Barrier Resources System. In general, the island has been developed in such a manner as to preserve as much of the natural vegetation from the ocean to the sound as possible.

## **Federal Standard - Base Disposal Area.**

Should present plans for sharing sand by Bogue Banks beaches not materialize due to funding problems or other unforeseen reasons, dredged maintenance material from the entrance and inner harbor channels of Morehead City Harbor, as well as the pump out of Brandt Island, would be distributed according to the Base Disposal Plan as determined using the Federal Standard (see Appendix B). The Base Disposal Plan represents the least cost alternative for the government to dispose of navigation dredged material, which is engineeringly feasible and environmentally acceptable. Therefore, all material disposed over the limits of the Base Disposal Area does not have to be economically justified. It is only necessary to demonstrate economic feasibility over those areas outside the Base Disposal Area (i.e., Pine Knoll Shores and Indian Beach).

Under the Base Disposal Plan, the outer harbor would be maintained by hopper dredge and the resultant 1.5 million cubic yards of excavated material would be placed in the Ocean Dredged Material Disposal Site or the previously approved nearshore



area. The pumpout of Brandt Island and the maintenance dredging of the inner harbor by pipeline dredge would be placed from Fort Macon State Park throughout the Atlantic Beach shoreline. Up to 4.8 million cubic yards (i.e., about 4.0 million from Brandt Island and about 0.8 million from the inner harbor) of beach quality sand may be placed along the shoreline from Fort Macon State Park to Atlantic Beach. If the North Carolina State Ports Authority does not pay for its share (i.e., 1.2 million cubic yards), this amount could be reduced to 3.6 million cubic yards.

### **Section 933 Project.**

Alternatively, Carteret County, the non-Federal sponsor, has requested under the Section 933 authority that the dredged material be shared between Fort Macon State Park, Atlantic Beach, Pine Knoll Shores, and Indian Beach. Working with the sponsor, the Corps of Engineers has formulated a plan that would distribute the dredged material in a uniform 30-ft berm design width stretching from Fort Macon to the Indian Beach/Emerald Isle border. Because Pine Knoll Shores and Indian Beach fall outside the Base Disposal Area, this portion of the beachfill referred to as the Section 933 Project is the portion that must be economically justified. That is the purpose of this economic analysis.

## **Establishing Property Values**

### **Structural Inventory**

A complete structural inventory of the oceanfront and second row of development along the shoreline of Bogue Banks was completed during the summer of 2001. This structural database, which is entered into the damage assessment program GRANDUC for this analysis, was collected and compiled by the Planning Services Section (CESAW-TS-PS). The applicable price level is July 2001, but remains suitable for October 2002 price levels. That summer, every individual structure along the first two rows of development was field checked, and a staff economist assigned it an estimate of its depreciated replacement value. Input from local builders and real estate people on structural values and current construction costs and practices went into the analysis. Factors such as age, condition, pile depth, quality of materials, and type and quality of construction also entered into this value determination.

The structural inventory of the relevant study area is made up of the oceanfront and second row of development in the towns of Atlantic Beach, Pine Knoll Shores, and Indian Beach. These first two rows are developed in a fairly continuous way with a wide range of structures including single-family homes, multi-unit condominium buildings, hotels, motels, and commercial buildings of various sorts. Values and susceptibility to storm damages vary considerably. Because of substantial variations in every factor that will affect storm damages, it is impossible to select any small areas or segments that could be considered representative of the study area as a whole. Therefore, an incremental analysis of segments of the beach is required.

The most common type structure found in the primary study area is the single family residential dwelling. These dwellings are typically one, two, or three-story frame or concrete block structures. Most are elevated on pilings but have a partially to fully enclosed ground level. The pilings may be embedded from 8 to 16 feet deep. In compliance with North Carolina State law, structures built since the mid 1970's must have the first floor constructed above the 100-year storm water surface elevation.

There are also many multi-story condominiums within the three-town study area. In addition, there is a large commercial base. Dozens of oceanfront motels and hotels comprise the most valuable of the commercial structures, but other types of commercial development comprised mostly of convenience stores, retail stores, offices, and restaurants are also found along the first two rows of development. Table 1 shows the number of buildings and total structure value of all structures along the oceanfront and second row by town. Altogether, a total of 842 structures were inventoried at a value of about \$377 million.

TABLE 1  
Structural Inventory by Town

<b>Town</b>	<b>Number</b>	<b>Oceanfront Structure Value</b>	<b>Second Row Structure Value</b>	<b>Total Structure Value</b>
Fort Macon	1	\$160,000	\$0	\$160,000
Atlantic Beach	470	\$105,959,000	\$31,768,000	\$137,727,000
Pine Knoll Shores	258	\$119,791,000	\$27,688,000	\$147,479,000
Indian Beach (Salter Path)	113	\$77,258,000	\$14,039,000	\$91,297,000
<b>TOTAL</b>	<b>842</b>	<b>\$303,168,000</b>	<b>\$73,495,000</b>	<b>\$376,663,000</b>

### **Content Value of the Structural Database.**

Estimates of values of contents of commercial structures in the primary study area are based on interviews with businessmen and insurance agents familiar with the Bogue Banks oceanfront, as well as empirical data collected for past studies. Businesses are entered into the damage model with a code for type of commercial

activity. Each type of business has a unique content factor applied to its structural value.

For estimating the value of household contents of residential structures in the study area, 40 percent of the structural value is used. This is based on site-specific responses from Bogue Banks officials, insurance agents, realtors, and home owners familiar with the development along this section of oceanfront. The majority of these properties are rentals but tend to be upscale, often renting for thousands of dollars per week during the summer months. There is a trend towards putting better quality furnishings in these homes as vacation tenants expect the same high quality and thoroughness of furnishings that one would find in second homes. Second home owners, who live in these homes several months of the year, are also better equipping these houses. Forty percent content to structure value is within the usual range of consistency with other beach nourishment studies along the North Carolina coast and is reasonable and appropriate for this study. Sensitivity analyses were done to examine the effects of changes in content value percentages. Using a content to structure value of 30 percent, for example, does not significantly change the outcome of the project's economic feasibility.

#### **Nearshore Land Value.**

One of the components of hurricane and storm damages is land loss due to long term erosion. Long term erosion is accounted for in each year and in each method of damage calculation. As a structure is lost to long term erosion, the value of the structure is taken as a loss that year, and the structure is taken out of the calculation process for the remainder of the period of analysis. Land lost to long term erosion is computed by multiplying the expected annual loss of land in acres by the value of nearshore upland. The value of nearshore land was determined through an analysis of recent sales of interior lots with no view of the ocean or sound. This value varies from town to town and is highest in Atlantic Beach. This is because Atlantic Beach is virtually built-out and there are no undeveloped interior lots. When an interior lot does sell for its land value, the price is relatively high and there is usually an older home on the lot that must be demolished. Table 2 shows the nearshore land values per acre and per square foot used for each town.

TABLE 2  
Nearshore Land Values by Town

Area	Value/Acre	Value/Sq.Ft.
Fort Macon	\$175,000	\$4.00
Atlantic Beach	565,000	13.00
Pine Knoll Shores	300,000	7.00
Indian Beach (Salter Path)	220,000	5.00

For example, as increments of land erode away in Pine Knoll Shores under the without project condition, \$300,000 per acre represents the decrease in value to the oceanfront parcels. These increments of land loss are computed linearly and annually in square feet. In this example, the value of an oceanfront lot 100 feet across by 100 feet deep is about \$70,000 when restricted to its nearshore land value. If it is eroding at 5 feet per year, the lot would lose 5 percent, or about \$3,500 of its value each year. This linear assumption is reasonable and non-subjective.

## Plan Formulation And Evaluation

### Existing Conditions.

Over recent years, hurricanes, subtropical storms, progressive erosion, and increasing development have greatly increased the potential for damages over the entire length of Bogue Banks. Except for the lands designated as public parks, the oceanfront is practically built-out and numerous structures are left vulnerable to damage by storms due to the eroded dune system and loss of natural protection. In an effort to combat shoreline erosion, a locally funded beach nourishment project is ongoing over much of the study area. This project proposes to place approximately 4.5 million cubic yards of sand over Pine Knoll Shores, Indian Beach, Salter Path, and Emerald Isle, approximately 16.8 miles of ocean shoreline. The project is planned to be completed in three phases over a three-year period. The first phase has been completed with the nourishment of 6.6 miles of beach in Pine Knoll Shores and Indian Beach with approximately 1.7 million cubic yards of sand. The second phase will place 1.8 million cubic yards of sand on three miles of Emerald Isle (and potentially .7 miles of Indian Beach that was not able to be completed in Phase I) in the winter months of 2002/2003. And the final phase, if implemented, would place 1 million cubic yards of sand on 6.7 miles of Emerald Isle in the winter of 2003/2004.

These one-time, locally funded nourishment efforts are not large enough to be considered anything other than stop-gap measures. The Section 933 Project, another one-time nourishment effort, is to be added seaward of the remainder of the locally funded beachfills in Pine Knoll Shores and Indian Beach. It too is expected to have a

limited life and not be a permanent solution to the erosion problems of these communities.

### **The Without Project Condition.**

This report presents two areas of beach placement. The Base Disposal Area would be along Fort Macon and Atlantic Beach, which is a distance of 32,000 feet. This area of least cost disposal will receive up to 4.8 million cubic yards of sand from Brandt Island and the normal maintenance cycle of Morehead City Harbor. Critical to this study is the estimate of the vulnerability to damages from coastal storms along the beaches of Bogue Banks associated with the Base Disposal Plan placement of material only on Fort Macon and Atlantic Beach. This alternative would amount to the "without project condition" and forms the basis for evaluating the degree of damage reduction that would be provided by the alternative, Section 933 Project on Pine Knoll Shores and Indian Beach.

In most cases, the without project condition is usually more akin to a "no action" plan. However, in the case of Morehead City Harbor maintenance, Base Disposal Plan includes pumping material to Fort Macon and Atlantic Beach. The alternative is to deposit some or all of the Brandt Island material along the 25,000 linear feet of oceanfront at Pine Knoll Shores and 13,000 linear feet of Indian Beach under the Section 933 authority.

Carteret County and the State of North Carolina have already committed large sums of money to studying long-term Federal nourishment projects along Bogue Banks. In the interim, the locally funded beach nourishment project described above is ongoing over much of the study area. Additionally, the State would likely help the locals governments battle erosion using the traditional emergency measures, including sandbagging, beach scraping, and piecemeal relocation. However, these measures are not expected to provide substantial reductions in storm damages over the long-term and, thus, would be the equivalent of a no action plan.

### **General Methodology.**

To analyze this 12-mile long stretch of coastline from Fort Macon to Indian Beach that comprises the overall study area, the shoreline of three Bogue Banks beach communities is divided into segments according to similar development patterns, existing dune dimensions, and erosion rates. Fort Macon, Atlantic Beach, Pine Knoll Shores, and Indian Beach are divided into a total of 12 segments. These average about 6,000 feet in length, with six comprising Fort Macon and Atlantic Beach (i.e., Base Disposal Area), and six comprising Pine Knoll Shores and Indian Beach (i.e., Section 933 Project). The costs versus benefits of a nourishment project for each segment are then evaluated incrementally.

Expected storm and erosion related damages are first computed for the Base Disposal Plan, and then again for the Section 933 Project. Both of these beach fill plans would prevent the progressive erosion of the shoreline, reduce damages caused by erosion, flooding, and wave impact during coastal storms, decrease storm related emergency expenditures, and increase the quality of recreational opportunities in the area.

Normally with beach nourishment evaluations, the plan formulation process involves the assessment of the degree of storm damage reduction provided by a wide range of beach fill configurations. However, with a Section 933 analysis, only one beach fill alternative must be demonstrated to be economically feasible taking into full account the benefits foregone from the normal Base Disposal Plan. Given the structural data base for the primary study area, the level of storm damage reduction for this beach fill configuration is determined by simulating hundreds of 20-year life cycles. This is accomplished through the use of the model, GRANDUC, which incorporates risk and uncertainty principles into the analysis.

Through a random selection process, a particular 20-year simulation may include several severe storms or perhaps none. All of the 20-year life cycle simulations are run for the existing conditions, then again for a particular plan. Then, the average storm damage reduction potential afforded by a particular design configuration is computed. These damages are then estimated at an expected annual amount. The storm damage reduction potential for a particular plan is computed in terms of the "net benefits" afforded by the plan. Normally, net benefit is defined as the difference in the expected annual benefits associated with a particular fill configuration and the average annual cost for that configuration. Plan formulation and evaluation using GRANDUC is based on the present value of the net benefits before annualizing.

### **Interest Rate and Period of Analysis.**

The interest rate for the analysis is 5-7/8 percent and a 20-year Period of analysis is used. October 2002 price levels are applied. The "base year" used for the economic analysis is 2004. The period of analysis for the Section 933 Project has been selected to be 20 years. This is based on a 10-year physical life for the Section 933 Project and doubling this time period for the period of analysis of the project. This period approximates the time over which benefits would be realized for the Section 933 Project, plus the additional length of time it would take for the beach profile to reach equilibrium with the without project condition's profile.

### **Alternative Plans.**

Initially, the without project condition, or in this case, the Base Disposal Plan, for Fort Macon and Atlantic Beach was evaluated. The alternative is the Section 933 Project, which is the only plan considered in great detail. As explained above, only one plan need be evaluated in determining economic feasibility. Although the

Recommended Plan was the only plan analyzed in detail, there were several plans initially assessed which would have provided protection for a number of different combinations of areas within the Study Area and the Base Disposal Plan Area. These plans were used as tools to assist in the initial determination of the one plan to evaluate in more detail.

### **Refinement of Erosion-Damage Relationship.**

Before describing estimates of potential damages, an explanation of one of the critical, underlying relationships that go into the damage calculations, namely, the erosion-damage curve is offered. The historical effects of long-term and storm related erosion on oceanfront structures along the beaches of North Carolina are not well documented. Very little data exists on how these structures react to storm forces of varying degrees of intensity. This lack of data has lead to the designing of erosion-damage curves comprised largely through professional judgment. The state of the art of modeling these relationships is improving, however, following the hurricanes of 1996-1999 along the North Carolina coast. Researchers like Spencer Rogers of North Carolina Sea Grant have begun collecting and analyzing data and publishing papers on this subject. In his report "Erosion Damage Thresholds in North Carolina," Mr. Rogers derived storm induced damage curves based on observed changes over time in coastal construction in North Carolina. The curves used in the Morehead City Harbor Section 933 Study are derived from these erosion-damage curves and are based on field data including the following structure identities:

- ❖ Oceanfront or not
- ❖ Number of stories
- ❖ On piles or not, long or short piles
- ❖ Size of the under house enclosure (none, small, partial, fully enclosed)
- ❖ Type of enclosure (none, finished, unfinished)
- ❖ High or low existing dune
- ❖ Structure type (commercial or residential)

For this analysis, these data were collected for every structure along the oceanfront and first row of development back from the oceanfront, along with their elevation and depreciated replacement value. The following further describes the four-character coding scheme of structure types used for this study, which was originally developed by a North Carolina State University team of researchers including Mr. Rogers. These codes are assigned upon field inspection of each structures and matched with both an appropriate erosion-damage curve and an inundation-damage curve.

## Building Inventories

### Four character scheme used for Bogue Banks database:

1. Number of stories (1,2,3)
2. On piles or not (P or N)
3. Size of underhouse enclosure (N=none, S=small (300 ft<sup>2</sup> or less), P=partial (300 ft<sup>2</sup> to full), F=fully enclosed)
4. Type of enclosure (N=none, F=finished, U=unfinished)

### Yielding the following list of structure types:

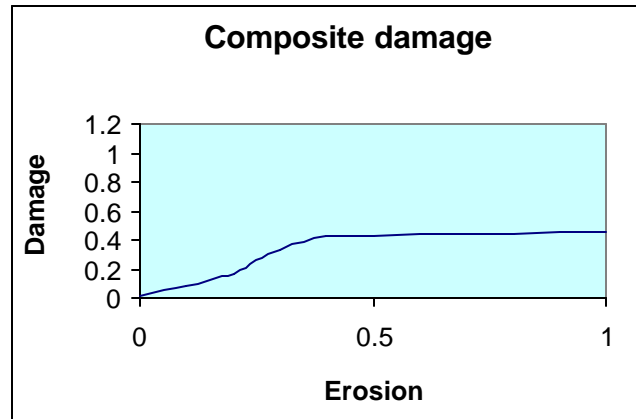
<u>Type</u>	<u>Description</u>
1NNN	One story on grade or low/crawl space foundation
1PNN	One story elevated on piles, no enclosures below
1PSF	One story elevated on piles, enclosed finished area below (enclosure less than or equal to 300 ft <sup>2</sup> )
1PPF	One story elevated on piles, enclosed finished area below (enclosure greater than 300 ft <sup>2</sup> but less than full)
1PFF	One story elevated on piles, enclosed finished area below (full enclosure)
1PSU	One story elevated on piles, unfinished enclosure below (enclosure less than 300 ft <sup>2</sup> )
1PPU	One story elevated on piles, unfinished enclosure below (enclosure greater than 300 ft <sup>2</sup> but less than full)
1PFU	One story elevated on piles, unfinished enclosure below (full enclosure)
2NNN	Two story on grade or low/crawl space foundation
2PNN	Two story elevated on piles, no enclosures below
2PSF	Two story elevated on piles, enclosed finished area below (enclosure less than 300 ft <sup>2</sup> )
2PPF	Two story elevated on piles, enclosed finished area below (enclosure greater than 300 ft <sup>2</sup> but less than full)
2PFF	Two story elevated on piles, enclosed finished area below (full enclosure)
2PSU	Two story elevated on piles, unfinished enclosure below (enclosure less than 300 ft <sup>2</sup> )
2PPU	Two story elevated on piles, unfinished enclosure below (enclosure greater than 300 ft <sup>2</sup> but less than full)
2PFU	Two story elevated on piles, unfinished enclosure below (full enclosure)

The erosion-damage curves used for this analysis are compilations of curves assigned for each part of the structure. For example, the curve 1 below is a compilation of curves 2 and 3 with weight given in proportion to the value assigned to each part of the structure. This example is for a 1PF, which is a 1-story house on piling with a full

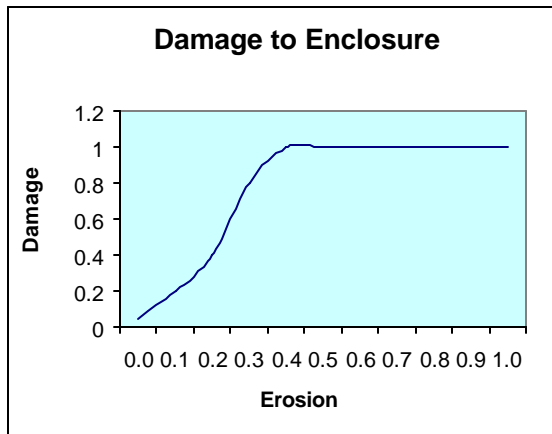


enclosure. It is further described as having long pilings and on low elevation. The enclosure is given a value of 40% of the entire structure and the rest of the structure is given a value of 60% of the entire structure value. These percentages were then used to weight the damage curves for the home and the enclosure and derive a composite damage curve.

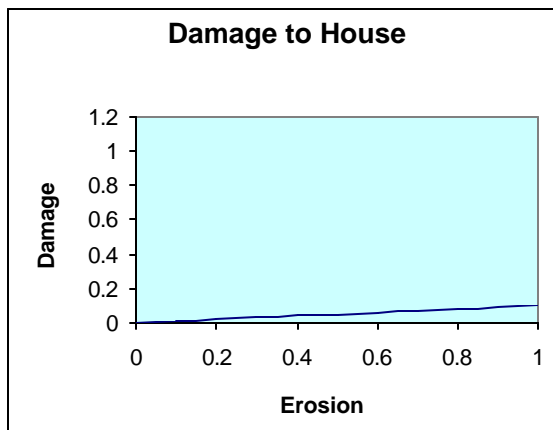
**Curve 1**



**Curve 2**



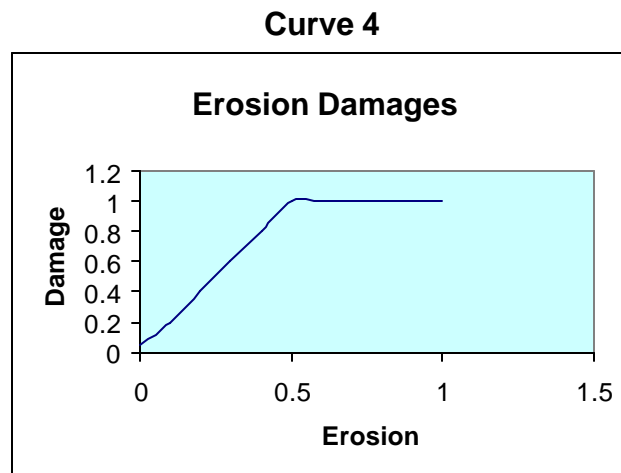
**Curve 3**



The use of construction dates estimated during the data collection assisted in determining of whether or not a structure was on long or short pilings. The North Carolina coastal construction codes changed in 1986 to require longer pilings than the 8 feet below grade to either 5 feet NGVD or 16 feet below grade, whichever is shallower. We developed our damage curves to distinguish between structures with

long or short pilings because the storm damages are different for the two. The curves were different for high and low dune elevation as well (12 feet is the limit).

Another consideration for curve assignment is whether the structure is in the oceanfront row or the second row. Those residential oceanfront structures with enclosures were typically assigned some variation of curves 1 or 2 above, depending on their age, length of piling, and size and quality of enclosure. Oceanfront homes with no enclosure, on a low dune, and pilings embedded 16 feet were assigned curve 3, which produces relatively minor damages. Oceanfront structures are most vulnerable to erosive forces and are usually built to the higher building code standard. Residential structures along the second row of development were also assigned an erosion-damage curve specific to their building characteristics, which often include shorter pilings. In this case, the structures were often assigned a more aggressive erosion-damage curve like curve 4 shown below.



The erosion indicator, or erosion depth threshold, is a vertical measurement that is used to look at erosion through structures. As the land erodes by this vertical amount through a structure, damage accrues to the structure. An erosion indicator of 0.5 feet was used for this analysis. Sensitivity analyses were done to examine the effects of changes in content value percentages, erosion indicators, and assignment of erosion curves from the simplest to curves that are composites of damages to different parts of the structure.

### **Benefit Categories.**

Three categories of benefits will be analyzed for the initial evaluation of the structural plans over the 12-mile study area. These benefit categories include: (1) hurricane and storm damage reduction, including land loss; (2) emergency costs and other damage reduction; and (3) recreation. Expected storm and erosion related

damages are computed for three conditions: (1) existing conditions; (2) the Base Disposal Plan conditions; and (3), the Section 933 Project conditions. The benefits for the Section 933 Project for which economic justification must be demonstrated, are the difference between Pine Knoll Shores' and Indian Beaches existing damages and the damages with the 933 Project in place. The benefits for the Base Disposal Plan are also calculated to compute benefits foregone, which are added to the cost side of the Section 933 Project.

### **Potential Hurricane and Storm Damages.**

Hurricane and storm damages are calculated under these three conditions for damages to structures and contents, roadways, and land lost due to long-term erosion. Land lost to long-term erosion is computed by multiplying the expected annual loss of land by the value of nearshore upland shown in table 2. Table 3 displays by segment the expected annual hurricane and storm damages, along with residual damages. Again, the residual damages illustrate how little the Base Disposal Plan helps in reducing hurricane and storm damages on Bogue Banks.

TABLE 3  
Expected Annual Hurricane and Storm Damages by Town

<b>TOWN</b>	<b>Existing</b>	<b>BD Plan</b>	<b>933 Plan</b>
Fort Macon	\$90,638	\$6,874	\$9,656
Atlantic Beach	\$4,365,381	\$2,495,970	\$3,198,587
Pine Knoll Shores	\$12,008,057	\$12,008,057	\$4,750,681
Indian Beach	\$2,534,965	\$2,534,965	\$842,311
TOTAL (Residual)	\$18,999,040	\$17,045,866	\$8,801,234

### **Hurricane and Storm Damage Reduction Benefits.**

Expected annual hurricane and storm damage reduction benefits for the Section 933 Project amount to the difference between damages under the 933 plan and the Base Disposal (BD) Plan for Pine Knoll Shores and Indian Beach. As shown in table 4, the hurricane and storm damage reduction benefits are estimated at \$8,950,000  $((\$18,912,000 - \$4,751,000) + (\$2,535,000 - \$842,000))$ . The residual expected annual damages along the Section 933 study area are about \$5,593,000. The decrease in Atlantic Beach and Fort Macon hurricane and storm damage benefits from the Section 933 Project (i.e., \$705,000) will be added to the cost side of the Section 933 Project as a benefit foregone later in the appendix.

TABLE 4  
Expected Annual Hurricane and Storm  
Benefits for the Section 933 Project

TOWN	Expected Annual H&S Damages			Expected Annual H&S Benefits 933 Plan
	Existing	BD Plan	933 Plan	
Pine Knoll Shores	\$12,008,057	\$12,008,057	\$4,750,681	\$7,257,376
Indian Beach	\$2,534,965	\$2,534,965	\$842,311	\$1,692,654
TOTAL	\$14,543,022	\$14,543,022	\$5,592,991	\$8,950,031

### Testing the Economic Feasibility of the Section 933 Project.

Plan formulation is generally based on costs versus hurricane and storm damage reduction benefits. Therefore, before describing other benefits accruing from the Section 933 Project, a plan formulation test of basic economic feasibility based solely on hurricane and storm damage reduction is appropriate at this point. As mentioned earlier, the 12-mile long stretch of coastline from Fort Macon through Indian Beach was divided into 12 segments averaging about 6,000 feet in length. Table 5 and 6 show this process of incrementally evaluating the economic feasibility of each segment. First, table 5 shows the economics of the Base Disposal Plan, including costs of pipelining and hoppering the dredged material. Although this is least cost disposal plan and does not require a positive benefit-to-cost ratio (BCR), it is interesting to note that its overall BCR is 1.3, and its hurricane and storm damage reduction benefits do outweigh its costs. More importantly, these calculations are needed to compute benefits foregone in support of the economics of the Section 933 Project and to ensure that the project is not extended beyond what the benefits will support. Benefits in table 5 and 6 are in present value form so they are comparable to first costs.

**TABLE 5**  
**Base Disposal Plan Economic Feasibility by Segment**

Seg- ment	Length (in feet)	Ave. Unit Cost- Pipeline- Base Plan	Volume (cu. Yd)	Volumetric Placement Cost	Mob/Demob (Divided Linearly)	Ocean Disposal Costs (Divided Linearly)	Total Costs Base Plan-(No Contingencies, etc. Included)	P.V. Benefits- Base Plan	Incremental Benefit Cost Ratio-933 Plan
1	3000	\$2.18	427,740	\$932,473	\$187,500	\$365,625	\$1,485,598	\$110,521	0.1
2	4000	\$1.93	813,042	\$1,569,171	\$250,000	\$487,500	\$2,306,671	\$860,067	0.4
3	6000	\$1.73	802,132	\$1,387,688	\$375,000	\$731,250	\$2,493,938	\$7,053,784	2.8
4	7000	\$2.11	836,118	\$1,764,209	\$437,500	\$853,125	\$3,054,834	\$4,428,195	1.4
5	6000	\$2.51	882,272	\$2,214,503	\$375,000	\$731,250	\$3,320,753	\$2,853,216	0.9
6	6000	\$2.91	1,038,696	\$3,022,605	\$375,000	\$731,250	\$4,128,855	\$7,326,072	1.8
7	7000								
8	7000								
9	7000								
10	6000								
11	5000								
12	6000								
Total	70000		4,800,000	\$10,890,650	\$2,000,000	\$3,900,000	\$16,790,650	\$22,631,855	1.3

Similarly, table 6 examines the segment-by-segment economic feasibility of the Section 933 Project after adding the hurricane and storm damage reduction benefits foregone to the cost side. Table 6 demonstrates that every segment throughout the Section 933 Project Area (segments 7-12) is economically justified. Segment 10 is divided in half to accommodate the best estimate of where the pipeline operation would end and the hopper operation would begin.

**TABLE 6**  
**Section 933 Project Economic Feasibility by Segment**

Seg- ment	Length (in feet)	Ave. Unit Cost- Pipelin	Ave. Unit Cost- Hopper to	Volume (cu. yd)	Volumetric Placement Cost	Mob/Demob (Divided Linearly)	Total Cost- Total Plan (No Conting encies, etc. included)	P.V. Benefits -Base Plan	P.V. Benefits- Total Plan	Costs of Benefits Foregone	Total Cos -933 Plan (No Conting encies , etc. included)	Incre mental Benefit Cost Ratio- Total Plan
1	3000	\$2.18		159,571	\$347,865	\$93,750	\$441,615	\$110,521	\$103,327	\$7,194	\$448,809	0.2
2	4000	\$1.93		458,750	\$885,388	\$125,000	\$1,010,388	\$860,067	\$835,032	\$25,035	\$1,035,423	0.8
3	6000	\$1.73		250,406	\$433,202	\$187,500	\$620,702	\$7,053,784	\$4,930,409	\$2,123,375	\$2,744,077	1.8
4	7000	\$2.11		209,642	\$442,345	\$218,750	\$661,095	\$4,428,195	\$1,811,495	\$2,616,700	\$3,277,795	0.6
5	6000	\$2.51		312,018	\$783,165	\$187,500	\$970,665	\$2,853,216	\$871,613	\$1,981,603	\$2,952,268	0.3
6	6000	\$2.91		443,329	\$1,290,087	\$187,500	\$1,477,587	\$7,326,072	\$5,906,367	\$1,419,705	\$2,897,292	2.0
7	7000	\$3.33		808,456	\$2,692,158	\$218,750	\$2,910,908	\$0	\$9,013,190	\$0	\$2,910,908	3.1
8	7000	\$3.83		954,648	\$3,656,302	\$218,750	\$3,875,052	\$0	\$36,038,399	\$0	\$3,875,052	9.3
9	7000	\$4.30		865,555	\$3,721,887	\$218,750	\$3,940,637	\$0	\$18,793,214	\$0	\$3,940,637	4.8
10A	3000	\$4.66		337,624	\$1,573,328	\$93,750	\$1,667,078	\$0	\$8,394,110	\$0	\$1,667,078	5.0
10B	3000		\$8.07	387,390	\$3,126,237	\$235,715	\$3,361,952	\$0	\$11,853,882	\$0	\$3,361,952	3.5
11	5000		\$8.29	530,322	\$4,396,369	\$392,860	\$4,789,229	\$0	\$13,258,858	\$0	\$4,789,229	2.8
12	6000		\$8.60	582,289	\$5,007,685	\$471,425	\$5,479,110	\$0	\$6,354,294	\$0	\$5,479,110	1.2
Total	70000			6,300,000	\$28,356,019	\$2,850,000	\$31,206,019	\$22,631,855	\$118,164,190	\$8,173,612	\$39,379,631	3.0

### Potential Emergency Costs and Other Damages.

In this analysis, emergency costs prevented refer to expected annual expenditures that residents and governments are experiencing under the without project condition that the Section 933 Project would preclude. Other damages prevented include storm damages that are not covered under the National Flood Insurance Program, but represent financial drains on public and private storm victims that a large beach nourishment project could prevent. The categories lumped into this benefit called emergency costs and other damages prevented include (1) beach scraping/pushing; (2) sandbagging; (3) emergency costs incurred by the North Carolina Department of Transportation; (4) damages to public property; (5) damages to private property other than structures and contents; and, (6) post-storm recovery expenses. the difference in expected annual totals of emergency costs and other damages attributable to the existing condition, the Base Disposal Plan, and the Section 933 Project are displayed by towns in table 7. These are based on actual FEMA damage survey reports submitted by the towns following the recent hurricanes in North Carolina.

**TABLE 7**  
**Expected Annual Emergency Costs and Other Damages by Town**

<b>TOWN</b>	<b>Existing</b>	<b>BD Plan</b>	<b>933 Project</b>
Fort Macon	\$0	\$0	\$0
Atlantic Beach	\$94,000	\$10,000	\$10,000
Pine Knoll Shores	\$90,000	\$90,000	\$10,000
Indian Beach	\$50,000	\$50,000	\$8,000
<b>TOTAL (Residual)</b>	<b>\$234,000</b>	<b>\$150,000</b>	<b>\$28,000</b>

These emergency costs and other damage reduction benefits do not amount to much, largely because Bogue Banks has luckily dodged most of the recent North Carolina hurricane landfalls. However, these expenses are included in an effort to identify all potential damage reduction benefits.

### **Emergency Costs and Other Damages Reduction Benefits.**

Just as with hurricane and storm damage reduction benefits, expected annual emergency costs and other damages reduction benefits over the Section 933 Study Area (i.e., Pine Knoll Shores and Indian Beach) amount to the difference between damages under the Section 933 Project and the Base Disposal (BD) Plan as shown in table 8. This amounts to expected annual emergency costs and other damage reduction (EC) benefits of \$122,000  $((\$90,000 - \$10,000) + (\$50,000 - \$8,000))$ . For these benefits, there are no benefits foregone.

**TABLE 8**  
**Emergency Costs and Other Damages Reduction Benefits**

<b>TOWN</b>	<b>Expected Annual EC Damages</b>			<b>Expected Annual EC Benefits 933 Plan</b>
	<b>Existing</b>	<b>BD Plan</b>	<b>933 Plan</b>	
Pine Knoll Shores	\$90,000	\$90,000	\$10,000	\$80,000
Indian Beach	\$50,000	\$50,000	\$8,000	\$42,000
<b>TOTAL</b>	<b>\$140,000</b>	<b>\$140,000</b>	<b>\$18,000</b>	<b>\$122,000</b>

### **Recreation Benefit Analysis.**

The existing recreation demand for beach activities along Bogue Banks is generated primarily by seasonal residents and visitors in the area, who either own a second home or occupy rental units. As erosion threatens the homes and motels in

these beach communities, it also threatens the recreation opportunities enjoyed by owners and seasonal visitors to the beach. Erosion in the last several years has severely narrowed the beach at Pine Knoll Shores and Indian Beach. This problem is expected to continue in the absence of a Federal beach fill project for these two towns. The Section 933 recreation analysis will compare the overall value of recreational experiences of continuing with the Base Disposal Plan versus the overall value of recreation experiences if the Section 933 Project were implemented.

The value of any improvement in the quality of recreation experience along these beaches will be analyzed using the unit-day value method. The unit-day method assigns a point value to various aspects of the recreation experience to determine the change in recreation values as a result of a project. Recreational values for the without project condition reflect a narrow, eroded beach having a pronounced escarpment and little width for picnicking, fishing, playing beach games, and sunbathing. The beach will likely be especially narrow or nonexistent at high tide.

One would expect recreation in the area protected by the Section 933 Project would have better recreation opportunities and a higher experience value for the new section of beach being nourished. The Section 933 Project would provide a berm of adequate width to accommodate the peak seasonal use expected by the towns of Pine Knoll Shores and Indian Beach. The recreational experience under this project condition would provide excellent conditions for swimming, fishing, sunbathing, walking, beach games, and other recreational activities. Recreation benefits for the plan of improvement are the difference in the value of a recreation experience per user day with the project and without it, times the estimated annual beach visitation for each town. Converting the point values to FY2002 unit-day values, and multiplying by the effected visitation will yield the recreation benefit attributable to the plan. A recreation benefits foregone adjustment may prove necessary if it is determined that Atlantic Beach and Fort Macon would suffer a decline in unit-day value if Section 933 Project were implemented.

The procedure used to estimate recreation benefits for the Section 933 analysis is explained in the following four steps. First, the maximum daily visitation for each town is estimated. With no pre-existing visitation estimates of Carteret County beaches use, the projected maximum daily visitation is based on filling all of the dwellings available to the beach users. This is accomplished in table 9.



**TABLE 9**  
**Estimate of Daily Peak Visitation by Town**

Type of Accomodations	Ave.No.People per Unit	Pine Knoll Shores		Indian Beach		Salter Path	
		Number of Units	Estimated Peak Visitation	Number of Units	Estimated Peak Visitation	Number of Units	Estimated Peak Visitation
Single Family Houses	5	950	4750	64	320	135	675
Mobile Homes	3.5	0	0	0	0	9	31.5
Multi-Family Houses	12	8	96	0	0	0	0
Condos / Apartments	4	982	3928	345	1380	51	204
Motel/Hotel Rooms	4	650	2600	0	0	32	128
RVs/Tent Spaces	3.5	0	0	424	1484	0	0
Day Use (Public Parking)	2	195	975	56	280	75	375
Total Estimated Peak Visitation		12,349		3,464		1,414	
Rounded to		12,300		3,500		1,400	

Assumptions: New public parking added at PKS & IB;  
Average number of people/unit is consistent with Land Use Plan;  
Calculations for day use include a turnover factor of 2.5 for each parking space.

Second, this maximum daily visitation is used only for July 4, traditionally the heaviest beach usage day of the year. Therefore, the rest of the beach season must be defined and daily visitation adjusted for weather and occupancy rates. The bottom line is the estimated annual beach visitation for each town as shown in table 10. The seasonal factor in table 10 is based on Carteret County's monthly occupancy rates.

TABLE 10  
Weighted Annual Visitation by Town

Month	Type	No. of Days	Seasonal Factor*	Visitation Factor	PKS	IB (w/SP)
Jan	Weekend	8	0.047	0.64	2,960	1,179
Feb	Weekend	8	0.0548	0.64	3,451	1,375
Mar	Weekday	21	0.0897	0.5	11,585	4,615
	Weekend	10	0.0897	0.64	7,061	2,813
	Weekday	21	0.1832	0.5	23,660	9,426
Apr	Weekend	8	0.1832	0.64	11,537	4,596
	Holiday	1	0.1832	0.64	1,442	575
	Weekday	21	0.2846	0.5	36,756	14,643
May	Weekend	9	0.2846	0.64	20,163	8,033
	Holiday	1	0.2846	0.64	2,240	893
Jun	Weekday	21	0.6517	0.5	84,167	33,530
	Weekend	9	0.6517	0.64	46,172	18,394
	Weekday	22	1.00	0.5	135,300	53,900
Jul	Weekend	8	1.00	0.64	62,976	25,088
	Holiday	1	1.00	1	<b>12,300</b>	<b>4,900</b>
Aug	Weekday	21	0.7346	0.5	94,874	37,795
	Weekend	10	0.7346	0.64	57,828	23,037
	Weekday	21	0.284	0.5	36,679	14,612
Sep	Weekend	8	0.284	0.64	17,885	7,125
	Holiday	1	0.284	0.64	2,236	891
Oct	Weekday	23	0.218	0.5	30,836	12,284
	Weekend	8	0.218	0.64	13,729	5,469
	Weekday	19	0.1009	0.5	11,790	4,697
Nov	Weekend	10	0.1009	0.64	7,943	3,164
	Holiday	1	0.1009	0.64	794	316
Dec	Weekend	8	0.0486	0.64	3,061	1,219
Total		299			739,425	294,568
Multiply by weather factor of .75					554,568	220,926
ANNUAL BEACH VISITATION, Rounded to					555,000	221,000

\* Seasonal factor is based on Carteret County's monthly occupancy rates.

Next, the value of the recreation beach where it has changed is compared to the former value of the beach under without project conditions using the unit-day value method. The unit-day method assigns a point value to various aspects of the recreation experience to determine the change in recreation values as a result of the project. This is shown in table 11. With and without project beach profiles were generated for the purpose of assigning point values for the various quality categories in table 11. A beach width of 100 feet or greater is considered adequate to achieve the maximum allowable points that a wide beach would bring. That is, point changes are only taken for reaches of the beach that fall below 100 feet wide under the without project condition, and once the width is reestablished at 100 feet, points are maximized. In other words, a 150-foot wide beach is esthetically no more valuable than a 100-foot wide beach. The 30-foot wide berm to be constructed with the Section 933 Project will extend the beach fill seaward from the existing profile, with an elevation of 7 feet NGVD, approximately the elevation of the natural vegetation line along the Bogue Banks beaches. Berm width is measured seaward along the top of the berm from the point where the top of berm intersects the natural profile. Seaward of the designed berm width, the with-project profile parallels the existing profile out to the closure depth of -27 feet NGVD. This design will give the beach a much wider appearance than the 30-foot design width so that claiming maximum allowable points for a wide beach is a reasonable assumption.

**TABLE 11**  
**Unit-Day Value Point Assignment by Towns**  
(PKS = Pine Knoll Shores;  
IB = Indian Beach including Salter Path)

Category	BDP		933 Project		Remarks
	PKS	IB	PKS	IB	
<b>Recreation Experience</b>	5	5	8	8	The natural, high foredune setting of Bogue Banks precludes overwash and the migration of beaches landward. For this reason, the without project condition would ultimately lead to a sharp interface between vertical, 25-foot high dune scarps and a small, almost non-existent beach platform. This would almost entirely preclude four wheel drive access, surf fishing, picnicking, sunbathing, launching small sailboats, accessing the ocean for swimming and surfing, and other recreational activities. The with project condition will allow numerous general activities.

	BDP		933 Project		Remarks
Category					
	PKS	IB	PKS	IB	
<b>Availability of Opportunity</b>	2	2	2	2	<p>The beach towns are evaluated independently.</p> <p>However, there are only two bridges that connect the island to the mainland. If the beaches of Atlantic Beach were inaccessible, one would have to drive further west along Bogue Banks or drive to the Emerald Isle bridge. If all of Bogue Banks was inaccessible, then one could visit by boat to Shackleford Banks and Hammock's Beach, located to the east and west of Bogue Banks, respectively. By automobile only, the next accessible beaches are N. Topsail to the SW and Nags Head to the NE.</p>
<b>Carrying Capacity</b>	5	5	8	8	<p>Again, the natural, high foredune setting of Bogue Banks precludes overwash and the migration of beaches landward and had reduced the capacity of the beach under without project conditions. Under with project conditions, there would be plenty of capacity.</p>
<b>Accessibility</b>	6	6	10	9	<p>The roadway infrastructure for Bogue Banks is generally comprised of Hwy 58 that is situated along some the highest topography on the island. With few exceptions, the shore parallel and perpendicular roads seaward of Highway 58 should remain in good shape unless the frontal dune is completely compromised. Under with project conditions, additional public access and parking sites will improve assessability.</p>
<b>Environmental Quality</b>	5	5	11	10	<p>The without project condition would lead to exposed septic tanks, broken stairs, and other debris along the beach. Also, the steep scarp with little or no beach would preclude turtle nesting activity, limit foraging bird activity, and would essentially represent a sharp line of submerged environments to maritime forest.</p>
<b>TOTAL</b>	23	23	39	37	

Finally, the with and without project unit-day point difference is converted to dollars and multiplied by the annual beach visitation to arrive at a recreation benefit attributable to the total Section 933 Project. The total expected annual recreation benefit for all four areas for the Section 933 Project is \$2,102,000, as shown in table 12. However, the additional recreation benefit above that of the Base Disposal Plan is \$1,009,000.

TABLE 12  
Expected Annual Recreation Benefits by Town

	<b>Pine Knoll Shores</b>	<b>Indian Beach (w/SP)</b>	<b>TOTAL</b>
Estimated Annual Beach Visitation	555,000	221,000	776,000
BDP (i.e., Existing Conditions) FY02 unit-day value points	23	23	
BDP FY02 unit-day value	\$3.96	\$3.96	
Expected Annual BDP value of recreation	\$2,197,800	\$875,160	\$3,072,960
Section 933 Project FY02 unit-day value points	39	37	
Section 933 Project FY02 unit-day value	\$5.32	\$5.11	
Expected annual Section 933 Project value of recreation	\$2,952,600	\$1,129,310	\$4,081,910
Expected Annual Recreation Benefit for Sec. 933 Project	\$754,800	\$254,150	\$1,008,950

It is an important distinction that the recreation benefits for this project analysis stem from improving the quality of the recreation experience, not from drawing more people. In general, the supply of beach exceeds the demand for beach recreation along this 10-mile stretch of beach. The project would not be the draw; it merely enhances the experience for persons using the beach in the vicinity of their house or motel.

Because a beach width of 100 feet or greater is considered adequate to achieve the maximum allowable points and this width is achieved throughout Fort Macon and Atlantic Beach by both the Base Disposal Plan and Section 933 Project, there would be no benefits foregone attributable to recreation. In other words, the beneficial impact for recreation of either plan throughout Fort Macon and Atlantic Beach would be the same.

### **Benefits Foregone.**

Benefits foregone were evaluated for the shoreline within the Base Disposal Plan (Fort Macon and Atlantic Beach) that would not receive the entire dredge disposal due to the proposed Section 933 Project. There are no benefits foregone related to emergency costs or recreation, only hurricane and storm damage reduction. As shown in table 6, the total expected annual benefits forgone are estimated at \$705,400 (i.e., \$8,173,612 in present value terms). This amount is added to the cost side of the Section 933 Project to account for the lower level of protection that the Base Disposal Plan would have offered Atlantic Beach and Fort Macon.

### **Benefits During Construction.**

Benefits during construction (BDC) are those benefits that accrue to the project before its completion. In other words, as the beach fill is constructed, the benefits to the newly improved shoreline are essentially claimable from that time forward. In the case of the Section 933 Project, BDC begin accumulating as the segments of the overall project are built. It is assumed that benefits accrue as expenditures for placement of the dredged material occur. The Section 933 Project is scheduled to be completed within 16 months. This monthly breakdown of the expected annual benefits is shown in table 13. Benefits foregone are subtracted from the total expected annual benefits before computing the monthly expected annual benefits (i.e.,  $\$8,367,000 / 12 = \$697,250$ ). Also, no recreation benefit is included in BDC since the esthetic quality of the beach would be questionable during construction. Therefore, the BDC are based on an expected annual benefit total of  $\$8,367,000$  ( $\$8,950,000$  (H&S Damage Reduction) +  $\$122,000$  (Emergency Costs Reduction) -  $\$705,000$  (Benefits Foregone)). As shown in table 14, BDC for the Section 933 Project amount to  $\$574,000$  on an annual basis.

**TABLE 13**  
**Computing Monthly Benefits for Benefits During Construction**  
**(5-7/8% Interest for 20 Years)**

Period	Month	Monthly Expend. Pipeline*	Monthly Expend. Hopper*	Total Expend.*	% exp. = %benefits	Cumulative %	Monthly Benefits
1	N-03	\$0				0.00%	\$0
2	D-03	\$2,035,686	\$654,846	\$2,690,532	9.49%	9.49%	\$66,155
3	J-04	\$2,035,686	\$654,846	\$2,690,532	9.49%	18.98%	\$132,310
4	F-04	\$2,035,686	\$654,846	\$2,690,532	9.49%	28.46%	\$198,465
5	M-04	\$2,035,686		\$2,035,686	7.18%	35.64%	\$248,518
6	A-04	\$2,035,686		\$2,035,686	7.18%	42.82%	\$298,572
7	M-04	\$2,035,686		\$2,035,686	7.18%	50.00%	\$348,625
8	J-04	\$2,035,686		\$2,035,686	7.18%	57.18%	\$398,678
9	J-04	\$2,035,686		\$2,035,686	7.18%	64.36%	\$448,732
10	A-04	\$2,035,686		\$2,035,686	7.18%	71.54%	\$498,785
11	S-04	\$2,035,686		\$2,035,686	7.18%	78.71%	\$548,839
12	O-04	\$2,035,686		\$2,035,686	7.18%	85.89%	\$598,892
13	N-04	\$2,035,686		\$2,035,686	7.18%	93.07%	\$648,946
14	D-04	\$0	\$654,846	\$654,846	2.31%	95.38%	\$665,047
15	J-05	\$0	\$654,846	\$654,846	2.31%	97.69%	\$681,149
16	F-05	\$0	\$654,846	\$654,846	2.31%	100.00%	\$697,250
Totals		\$24,428,232	\$3,929,076	\$28,357,308	100.00%		\$697,250

\*Placement Costs Only--includes no Mob and Demob.

**TABLE 14**  
**Expected Annual Benefits During Construction**  
**(5-7/8% Interest for 20 Years)**

PERIOD	MONTH	MONTHLY BENEFITS	PERIODS	FACTOR	BDC
1	N-03	\$0	15.5	1.078642	\$0
2	D-03	\$66,155	14.5	1.073387	\$71,010
3	J-04	\$132,310	13.5	1.068157	\$141,328
4	F-04	\$198,465	12.5	1.062953	\$210,958
5	M-04	\$248,518	11.5	1.057774	\$262,876
6	A-04	\$298,572	10.5	1.05262	\$314,282
7	M-04	\$348,625	9.5	1.047492	\$365,182
8	J-04	\$398,678	8.5	1.042388	\$415,578
9	J-04	\$448,732	7.5	1.03731	\$465,474
10	A-04	\$498,785	6.5	1.032256	\$514,874
11	S-04	\$548,839	5.5	1.027226	\$563,782
12	O-04	\$598,892	4.5	1.022222	\$612,201
13	N-04	\$648,946	3.5	1.017241	\$660,134
14	D-04	\$665,047	2.5	1.012285	\$673,217
15	J-05	\$681,149	1.5	1.007353	\$686,157
16	F-05	\$697,250	0.5	1.002445	\$698,955
TOTAL					\$6,656,008
I&A					0.086302
ANNUAL	EXPECTED		BDC		\$574,427

## Economic Results

### Benefit Summary.

Expected annual benefits for the Section 933 Project are summarized in table 15.

**TABLE 15**  
**Expected Annual Benefits**

Hurricane and Storm Damage Reduction	\$8,950,000
Emergency Costs and Other Damages Reduction	\$122,000
Recreation	\$1,009,000
Benefits During Construction	<u>\$574,000</u>
<b>TOTAL</b>	<b>\$10,655,000</b>



## Cost Summary.

The first cost figures for the total Section 933 Project and the Base Disposal Plan are shown in table 16. The difference, or \$16,354,000, is the amount that requires economic justification. Benefits forgone associated with the Base Disposal Plan will be added to the costs requiring economic justification during the computation of expected annual costs. The first costs for the Section 933 Project were computed using a construction schedule of 16 months and both pipeline and hopper dredges. This was determined to be the best way to balance costs, environmental resources, and to put the project in place quickly so that structures on the beach will not continue to be vulnerable to storm damages. These estimates of construction time periods become the basis for the Interest During Construction (IDC) calculations.

TABLE 16  
First Cost Summary

Description	Sand Placement Location	Costs
<b>TOTAL SECTION 933 PROJECT+ MODIFIED DISP PLAN:</b>		
Mobilization & Demobilization		\$2,850,000
Pumpout Brandt Island & Inner Harbor	Fort Macon & Atlantic Beach	\$3,706,654
Pumpout Brandt Island, Inner Harbor, & Entrance Channel	AB, PKS, & IB	\$24,654,870
Embankment Replacement		\$500,000
Beach Tilling		\$137,600
Planning Engineering & Design		\$375,000
Construction Management		\$100,000
SUBTOTAL before Contingencies		\$32,324,124
Contingencies (10%)		\$3,211,876
<b>TOTAL Section 933 Project + Modified Disposal Plan</b>		<b>\$35,536,000</b>
<b>BASE DISPOSAL PLAN:</b>		
Mobilization & Demobilization		\$1,750,000
Pumpout Brandt Island & Inner Harbor	Atlantic Beach and Fort Macon	\$10,737,600
Mobilization & Demobilization		\$250,000
Dredge Entrance Channel	Near Shore Disposal Area	\$3,900,000
Embankment Replacement		\$500,000
Beach Tilling		\$130,400
Planning Engineering & Design		\$120,000
Construction Management		\$50,000
SUBTOTAL before Contingencies		\$17,438,000
Contingencies (10%)		\$1,744,000
<b>TOTAL Base Disposal Plan</b>		<b>\$19,182,000</b>
<b>SECTION 933 PROJECT (To Be Justified):</b>		<b>\$16,354,000</b>

Interest During Construction. The cost of tying up construction capital during a period of time in which no immediate benefits are produced is accounted for in table 17 as the item "interest during construction" (IDC). IDC costs are added to construction and other initial costs to determine investment costs. Average annual costs are determined based on investment costs which include IDC. IDC is based on \$17,104,000, which includes the extra first costs (\$16,354,000) and extra study costs (\$750,000) associated with the Section 933 Project. The amount of IDC due to constructing the Section 933 Project instead of the Base Disposal Plan is \$708,000, as shown in table 17.

Table 17  
Interest During Construction

PROJECT: Morehead City Harbor Section 933				
INTEREST RATE: 0.05875				
NUMBER OF PERIODS: 38 MONTHS				
NET CONSTRUCTION COST = \$17,104,000				
IDC= \$708,081				
PERIODS	MONTH	FACTOR	EXPENDITURE	PW AMT.
0.5	J-02	1.200989	\$35,000	\$42,035
1.5	F-02	1.195138	\$35,000	\$41,830
2.5	M-02	1.189316	\$35,000	\$41,626
3.5	A-02	1.183521	\$35,000	\$41,423
4.5	M-02	1.177755	\$35,000	\$41,221
5.5	J-02	1.172017	\$35,000	\$41,021
6.5	J-02	1.166307	\$35,000	\$40,821
7.5	A-02	1.160625	\$35,000	\$40,622
8.5	S-02	1.15497	\$35,000	\$40,424
9.5	O-02	1.149343	\$35,000	\$40,227
10.5	N-02	1.143744	\$40,000	\$45,750
11.5	D-02	1.138171	\$20,000	\$22,763
12.5	J-03	1.132626	\$50,000	\$56,631
13.5	F-03	1.127108	\$50,000	\$56,355
14.5	M-03	1.121617	\$40,000	\$44,865
15.5	A-03	1.116152	\$40,000	\$44,646
16.5	M-03	1.110715	\$40,000	\$44,429
17.5	J-03	1.105303	\$40,000	\$44,212
18.5	J-03	1.099918	\$40,000	\$43,997
19.5	A-03	1.094559	\$10,000	\$10,946
20.5	S-03	1.089227	\$10,000	\$10,892
21.5	O-03	1.08392	\$20,000	\$21,678
22.5	N-03	1.078639	\$0	\$0
23.5	D-03	1.073384	\$580,000	\$622,563
24.5	J-04	1.068155	\$1,440,000	\$1,538,143
25.5	F-04	1.062951	\$1,440,000	\$1,530,649
26.5	M-04	1.057772	\$1,440,000	\$1,523,192

27.5	A-04	1.052618	\$934,000	\$983,146
28.5	M-04	1.04749	\$930,000	\$974,166
29.5	J-04	1.042387	\$930,000	\$969,420
30.5	J-04	1.037308	\$930,000	\$964,697
31.5	A-04	1.032255	\$930,000	\$959,997
32.5	S-04	1.027225	\$930,000	\$955,320
33.5	O-04	1.022221	\$930,000	\$950,665
34.5	N-04	1.017241	\$930,000	\$946,034
35.5	D-04	1.012285	\$930,000	\$941,425
36.5	J-05	1.007353	\$1,370,000	\$1,380,073
37.5	F-05	1.002445	\$1,710,000	\$1,714,181
total			\$17,104,000	\$17,812,081

### **Expected Annual Costs and Comparison of Benefits and Costs.**

Table 18 shows the expected annual costs of the Section 933 Project that requires economic justification to be \$2,178,000. When compared to expected annual benefits of \$10,655,000, the result is a benefit-to-cost ratio of 4.9. This computation is based on an interest rate of 5-7/8 percent amortized over a 20-year period of analysis, and includes IDC and benefits foregone.

**TABLE 18**  
Expected Annual Costs and Comparison of Benefits and Costs

<b>Total Project Summary</b>	<b>Total 933 Project</b>	<b>Base Disposal Plan</b>	<b>Difference to be Justified</b>
<b>Total Initial Construction:</b>	\$36,927,000	\$20,573,000	\$16,354,000
Interest During Construction	\$708,000	\$0	\$708,000
<b>Total Investment Cost</b>	<b>\$37,644,000</b>	<b>\$20,573,000</b>	<b>\$17,062,000</b>
<b>Expected Annual Cost:</b>			
I&A-20 years			\$1,473,000
Annual Benefits Foregone			\$705,000
<b>Total Expected Annual Cost</b>			<b>\$2,208,000</b>
<b>Total Benefits:</b>			<b>\$10,655,000</b>
<b>Net Benefits:</b>			<b>\$8,477,000</b>
<b>Benefit-to-Cost Ratio:</b>			<b>4.9</b>

**Effectiveness of the Section 933 Project.**

For the Section 933 Project study area, the effectiveness of the Section 933 Project at reducing hurricane and storm damages over Pine Knoll Shores and Indian Beach is about 62 percent ( $1 - (\$5,593,000 / \$14,543,000)$ ). The residual expected annual damages along the Section 933 Study Area shoreline are estimated at \$5,593,000. When the additional shorelines of Fort Macon and Atlantic Beach are considered with the Section 933 portion, the overall effectiveness of the beach fill from Fort Macon through Indian Beach goes to 54 percent ( $1 - (\$8,801,000 / \$18,999,000)$ ). Either plan compares favorably to the Base Disposal Plan's effectiveness of only about 10 percent ( $1 - (\$17,046,000 / \$18,999,000)$ ), which leaves about \$17,046,000 in expected annual hurricane and storm damages. Again, this large difference is due to fact that the Section 933 Project addresses the areas where the damage potential is the greatest, namely, Pine Knoll Shores and Indian Beach.

## Socioeconomic Conditions

### Base Socioeconomic Conditions.

From 1990 to 2000, the population of Carteret County grew at a rate of 13% (i.e., 1990 population was 52,407 and 2000 population was 59,383) as shown in table 19. About 40 percent of the residents live in one of the county's municipalities. With its overwhelming economic emphasis on tourism, retail sales in Carteret County comprise the most important source of jobs and income for the county's economy. In 1993, total farm income for Carteret County was over 18 million dollars, with corn, soybeans, and tobacco the leading commodities. In 1995, the manufacturing sector employed about 10 percent of Carteret County workers.

The North Carolina Office of State Budget and Management estimates Carteret County's 1994 employment at 25,000, with about 35 percent in trade and 21 percent in Government employment. In 1997, per capita income in Carteret County was estimated at \$21,624, somewhat higher than the North Carolina per capita income of \$20,217.

The 1990's were a decade of rapid growth for the Carteret County beaches. The populations of the towns and Carteret County since 1990 are shown below. The total permanent population for the three principal towns in 2000 is estimated at 3,400. However, peak daily population in the summer can swell to more than 160,000 for the entire county.

TABLE 19  
Population Statistics  
Carteret County, North Carolina

<u>Town/County</u>	<u>1990 Population</u>	<u>2000 Population</u>
Atlantic Beach	720	789
Pine Knoll Shores	1,360	1,524
Indian Beach	153	95
Morehead City	6,046	7,691
Carteret County	52,407	59,383

## Projected Socioeconomic Conditions.

Carteret County population projections for 2000 – 2020 are shown below in table 20.

TABLE 20  
Population Projections  
Carteret County, North Carolina

<u>County</u>	<u>2005 Population</u>	<u>2010 Population</u>	<u>2020 Population</u>
Carteret	65,633	69,358	76,341

Source: Office of State Planning, State of North Carolina.

In the summer months, a large portion of the homes along Bogue Banks are available as summer rentals to vacationers. Almost 2 million people, including those residing in the Research Triangle area of North Carolina, live within a two-hour drive of these beaches. During the summer months, the population of Carteret County is estimated to exceed 160,000 people. In the off-season months, it drops to 59,000, which includes about 789 permanent residents in Atlantic Beach (2000), 1,524 in Pine Knoll Shores, 95 in Indian Beach and 7,691 in Morehead City.

**MOREHEAD CITY HARBOR  
CARTERET COUNTY, NORTH CAROLINA  
SECTION 933  
EVALUATION REPORT**

**APPENDIX E**

**BEACH ACCESS/PARKING ANALYSIS  
AND REQUIREMENTS**





## **APPENDIX E**

### **BEACH ACCESS/PARKING ANALYSIS AND REQUIREMENTS**

The construction of a Section 933 project is dependent in part upon the sponsor fulfilling the requirements as outlined in the “933 PROJECT REQUIREMENTS” section of the report. The stipulations (ER 1165-2-130, 15 June 1989, and ER 1105-2-100, 22 April 2000) that the beaches receiving the material must be open to the public and provide reasonable access has been carefully scrutinized. The Corps’ regulations require that in order to be deemed “public” beaches, the sponsor must provide public access points every one-half mile with sufficient public parking within one-quarter mile. The regulations also refer to sufficient parking in terms of accommodating “projected use demands,” and are further defined as sufficient to accommodate the lesser of the peak hour demand or the beach capacity. Finally, in computing parking requirements, the number of beach users not requiring parking is to be deducted from the design figure.

#### **Beach Capacity vs. Peak Hour Demand**

A determination was made that the maximum capacity of the 933 project area is significantly greater than the peak hour demand, which is assumed to be equivalent to peak hour usage, therefore peak hour usage was used to determine parking requirements. The following outlines the process and assumptions used to come to this conclusion.

This analysis assumes that visitors will each require 100 square feet of beach per visit. Because some visitors spend only part of the day at the beach, a turnover rate of 2 visitors per day per 100 square feet of beach is used as an adjustment. The smallest alternative project design considered proposes a 25-foot berm, resulting in 145 feet width of usable beach. Using this most conservative design template, the maximum project area would include 38,000 feet of shoreline of Indian Beach, Salter Path and Pine Knoll Shores. This would result in 5,510,000 square feet with an instantaneous capacity of 55,100, and using a turnover rate of 2, a maximum daily beach capacity of 110,200. This number is considered a conservative estimate because the other alternative design templates evaluated would result in an even larger beach capacity.

In an effort to ascertain data on peak hour usage, aerial photos were taken of the 933 project area between 11:15 and 11:40 a.m., EDT, on July 4, 2002. The aerial photos showed 828 people on the beaches of Pine Knoll Shores and 395 people on Indian Beach. The photos also identified tents and umbrellas on the beach; however, we were not able to discern whether an individual was underneath either of these items. Therefore, we made the assumption that there was an average of two (2) people under each tent, and an average of 1.5 persons under each umbrella. These additional numbers resulted in an adjusted peak hour usage total of 1,255 people on the beach within the Town of Pine Knoll

Shores and 760 people on Indian Beach and Salter Path beaches.

The 4<sup>th</sup> of July is assumed to be the peak day of the year for visitors on beaches. However, because the 4<sup>th</sup> of July fell on a Thursday, the peak hour usage was perhaps not accurately reflected, assuming that a higher number of visitors would have been present if the holiday had fallen on a weekend. Therefore, the numbers were adjusted accordingly. An increase of 14.2% was used as the adjustment. This adjustment was calculated to be the average percent difference in the volume of traffic crossing the Emerald Isle and Atlantic Bridges on Friday, July 5<sup>th</sup>, compared to Thursday, July 4<sup>th</sup>. The traffic survey data was provided by the Department of Transportation. Using the 14.2% adjustment the Pine Knoll Shores beaches would have had a peak hour usage of 1,433 and Indian Beach and Salter Path would have 868.

The projected growth rate of the peak hour usage over the life of the project was determined using the State of North Carolina Demographics Office data that projects a North Carolina average annual growth rate of 1.8% between 2000 and 2010. This rate was thus adopted as the project annual growth rate for the peak hour usage over the 10-year life span of the project with a base year of 2004 and continuing through 2014. The projected peak hour beach use demands for 2014 will therefore become 1,760 for Pine Knoll Shores and 1,075 for Indian Beach.

**Table 1.**

<b>Beach Usage</b>				
	<i># of People in Photos</i>	<i># Adjusted For Tents/Umbrellas.</i>	<i>Total # visitors on beach (14% Ad.j)</i>	<i>Yr 2014 Peak Hr. Beach Use</i>
PKS	828	1255	1433	1760
IB	395	760	868	1075

The capacity and usage of existing public parking for the 933 project area was evaluated using the 4 July 2002 aerial photography. The Town of Pine Knoll Shores had a total of 60 public parking spaces within one-quarter mile of the Iron Steamer public beach access while Indian Beach and Salter Path had a total of 111 at their two public beach access sites. The aerial photos indicated 22 of the 60 parking spaces available were filled in Pine Knoll Shores and 37 of the 111 parking spaces were occupied in Indian Beach.

Assuming that the number of parking spaces utilized would have also increased if the holiday had fallen on a Saturday, the number of parking spaces utilized was also adjusted by the 14.2% used previously. This results in an adjusted usage of 25 spaces for Pine Knoll Shores and 42 for Indian Beach. Assuming 2 persons per car, Pine Knoll Shores had a peak hour usage (peak hour demand), by those requiring parking, of 50 persons, and Indian Beach had 84 (Table 2). Dividing the peak hour usage for these visitors by the total number of visitors calculated from above (1,433 for Pine Knoll Shores and 868 for Indian Beach) leads to an estimate of 3.5% for Pine Knoll Shores and 9.7% for Indian Beach as the

percentage of visitors that are considered “day-users” of the beach. These are the visitors that require public parking in order to access the beach (Table 3).

**Table 2.**

<b>July 4<sup>th</sup> Parking</b>				
	<i>Spaces Available on July 4<sup>th</sup></i>	<i># of Spaces Occupied on 4<sup>th</sup></i>	<i>14% Weekend Adjustment</i>	<i>Peak Hour Demand (2/car)</i>
PKS	60	22	25	50
IB	111	37	42	84

**Table 3.**

<b>Day Users on July 4<sup>th</sup></b>		
	<i>Peak Hr Usage/Total # Visitors</i>	<i>% Day Users</i>
PKS	50/1433	3.5%
IB	84/868	9.7%

Since these photos were taken an additional 130 spaces have been added to Pine Knoll Shores for a total of 190 spaces. An average of 2 persons per car on the peak day was assumed for the public parking spaces. Therefore, the current public parking provides a maximum capacity, at any one point in time, for 380 persons for Pine Knoll Shores and 222 persons for Indian Beach. These capacities clearly meet the criteria for providing adequate parking for the current demand (Table 4).

**Table 4.**

<b>2002 Parking Analysis</b>				
	<i>Current # of Spaces Available</i>	<i>Peak Hour Capacity (2/car)</i>	<i>Peak Hour Demand (2/car)</i>	<i># of Spaces Req'd in Yr 2002</i>
PKS	190	380	50	25
IB	111	222	84	42

By projecting the current peak hour demands through the project life by the same 1.8% annually, the demand for Pine Knoll Shores grows to 62 persons and Indian Beach grows to 104, leading to requirements of 31 spaces for Pine Knoll Shores and 52 spaces for Indian Beach (Table 5). The Corps requires parking to be associated with public access sites. The parking must be within one-quarter mile of the access site and must be of sufficient quantity to meet the projected use demands, based on peak hour usage. Therefore, using the current data available, existing parking (Pine Knoll Shores = 190 spaces, Indian Beach = 111 spaces) currently meets the projected use demands (Pine Knoll Shores = 31 spaces, Indian Beach = 52 spaces).

**Table 5.**

<b>2014 Parking Analysis</b>				
	<i>2002 Peak Hour Demand</i>	<i># of Spaces Req'd in Yr 2002</i>	<i>2014 Peak Hour Demand</i>	<i># of Spaces Req'd in Yr 2014</i>
PKS	50	25	62	31
IB	84	42	104	52

An alternative assessment, although admittedly simplistic, can be done by observing the percentage of spaces not occupied at the “peak hour” (63% for Pine Knoll Shores, and 67% for Indian Beach) and the conclusion made that because there were unoccupied parking spaces (more supply than peak usage) at that time, the parking for the project areas meets peak capacity requirements.

However, it is important to keep in mind that meeting peak hour capacity does not alleviate the sponsor’s obligation to provide parking within one-quarter mile of each access site. The details of which are discussed under the “Parking Criteria” section following below.

**\*\*NOTE\*\*** *In determining the peak hour demand for Pine Knoll Shores it became apparent that the aerial photography may not accurately represent the true demand for parking at Pine Knoll Shores. This is due to several factors. The first being that none of the parking spaces currently claimed by Pine Knoll Shores were available on the 4<sup>th</sup> of July except for the Iron Steamer’s 60 spaces. Since additional spaces have been added, the measurement made is already dated since increased supply will ultimately lead to increased demand and usage.*

*Furthermore, the Iron Steamer’s 60 spaces were unavailable during the construction of the private beach nourishment project, and had only been reopened to the public within a month of the 4<sup>th</sup> of July. Therefore, for many months prior to the photographs, there effectively was no public parking (per Corps’ definitions) available, and therefore, with no “supply” available, the usage would have similarly decreased. It is assumed that a majority of the public was still unaware of the opening of the Iron Steamer and therefore would not have made the effort to seek out this parking option.*

*Additionally, the percentage of Pine Knoll Shores “day-users” calculated using the data from these photographs resulted in a number significantly lower than what the Corps’ has traditionally found to be the average for beach studies. Indian Beach was in the range that the Corps would expect (9.7%), as was Emerald Isle (15.0%) and Atlantic Beach (13.8%), whereas Pine Knoll Shores was at 3.5%.*

*And finally, Pine Knoll Shore’s 1996 Land Use Plan, developed as required by the North Carolina Coastal Area Management Act (CAMA), estimates their peak day, day-visitor populations to be in excess of 50,000 persons, as estimated by the Pine Knoll Shores Police Department. It was noted in the 1996 Land Use Plan that the average daily traffic count (ADT) west of the Atlantic Beach Bridge in 1994 was 23,300 automobiles. If one automobile averages two persons, 46,600 persons would have entered Bogue Banks heading west on N.C. 58. It was assumed in the 1996 Land Use Plan that a considerable amount of this traffic enters Pine Knoll Shores on a daily basis. However, such a huge discrepancy between the Corps’ findings and the Town’s estimates leads to a*

*question of the validity of the numbers.*

## **Parking Analysis Methodology**

Parking is a component of the recreation analysis, which uses the Unit Day Value (UDV) evaluation method to generate recreation benefits. This is discussed in further detail in the recreation analyses section within the economic analysis (see Appendix D) .

According to ER 1105-2-100, the estimation of visitation must be based on data, either at the existing project or by comparisons with other similar resources. Because the study area has recently completed a project very similar in nature to the one that is being proposed, it was deemed appropriate to look at the visitation on the existing area as the basis of our estimations.

The determination of peak hour demand ideally would involve gathering survey data from visitors on the beach. This would more closely identify the number and percentage of permanent residents, short-term renters, hotel guests, campers, and day users and their requirements (demands) for parking and access. The survey would also attempt to measure the demand not only from those at the beach, but those who would have come to the beach but did not do so based on a perceived parking availability problem. This type of survey requires peak day/peak hour data collection, and therefore will not be able to be conducted for this study. Therefore this report's findings will be used to assess the adequacy of parking.

## **Access and Parking Requirements**

Sponsors must comply with the Section 933 requirements as outlined in Section I of the attached report as well those requirements detailed below:

1. For those areas to be included as part of the project, access must be provided a minimum of every one-half mile or either an item of local cooperation specifying such a requirement and public use throughout the period of analysis of the project must be included in the project recommendations, or the cost sharing must be based on private use (the sponsor must pay 100%).
2. Access every one-half mile implies parking and parking must be within one-quarter mile of any access site for which the sponsor wishes to take credit.
3. Sufficient parking must be provided to accommodate the lesser of beach capacity or peak hour demand. Peak hour demand will be calculated and separately applied to each Town, City, Village, etc., within the project area. If the project area does not include the entire limits of a Town, for example, only that portion which will receive the project will need to be included in the calculation. For example, if a Town is 6 miles long and the entire Town will be included in the

project, then the peak hour demand will be measured for the entire 6 miles. If, however, only 4 of the 6 miles of the Town will be included in the project, only the 4 miles need be considered in determining peak hour demand. The development of the peak hour demand will be conducted by the Corps of Engineers.

4. Because Federal investment is distributed throughout the 933 project area, the number of parking spaces must similarly be reasonably distributed. The following guidelines will be followed which are intended to provide the sponsor flexibility in their planning efforts to best fit the needs of their communities' unique situations, while ensuring that the general public is provided complete access to the beaches that have been nourished using Federal funds.

A. A percentage of the peak hour demand shall be distributed throughout the area from which it was calculated (see #3). This percentage will be determined by the length of the project. Every two (2) miles of the area shall contain the same percentage of the total peak hour demand. For example, a project area ten miles long, with a peak hour demand of 250 parking spaces would require a minimum of 20% of these spaces (50) to be located within each 2 miles of the project area. Two miles was selected as a criteria both because Corps' beach renourishment projects are typically not undertaken for projects under two miles in length, and also because no Town, City, etc., along the North Carolina barrier islands is less than two miles (Indian Beach/Salter Path was considered one "town").

B. A minimum of ten parking spaces must be associated with every access site claimed. The average area of a residential, ocean-front lot, within North Carolina would accommodate this minimum of ten parking spaces. In order to meet the spirit of the regulations to provide public access to those beaches receiving Federal funding for a Section 933 project, it was decided that the sponsor should provide this minimum.

5. The sponsor will be held responsible for the number of parking spaces committed to over the period of analysis of the project. If, for whatever reason, the parking spaces are no longer made available to the general public on an equal basis during the period of analysis of the project, the sponsor will be responsible for ensuring that the Corps parking criteria are still met. Failure to do so would result in sections of the project reverting to private beach status and therefore those sections in non-compliance would no longer qualify for Federal cost sharing.

6. The sponsor may also choose to provide public transportation to other beach access sites that do not meet the minimum requirement of 10 parking spaces. The intent of the Corps' criteria is to ensure access to the public on an equal basis for those sections of beach receiving Federal cost sharing. If a transportation option is chosen by the sponsor for certain sections of the beach, this intent must still be met by some combination of parking and transportation.

For example the plan would have to ensure that access is provided year-round and accommodates demand. The details outlining the specifics of what exactly the sponsor would commit to providing must be documented in an overall beach access and parking plan for the project which must be submitted and approved by the Corps of Engineers.

7. Handicap access and parking must be considered and implemented as required by State and Federal regulations. Section 504 of the Rehabilitation Act and the Architectural and Transportation Barriers Act ensure reasonable accommodation and accessibility for all individuals with disabilities to properties and programs that receive or benefit from Federal financial assistance.

8. Parking and access commitments made to meet the above criteria must either be in place, or be incorporated as a condition of the Project Cooperation Agreement (PCA). These commitments must be fulfilled prior to construction. Requests for exceptions to these criteria must be formally submitted to the project manager along with a detailed description of the situation and reasons why the exception is being sought.

### **Existing and Proposed Parking and Access Sites**

The current and proposed future access/parking sites in the Section 933 project area are depicted in the sponsor's public beach access plan (Appendix E-9 - Exhibit 1). There are currently 8 public access sites and 301 public parking spaces within the project area. These sites are depicted in blue on the sponsor's map. The sponsor has committed to providing 8 additional access sites for a total of 16 access sites in the project area. These proposed access sites are depicted in red on the sponsor's map. Access sites are to be acquired in fee or as perpetual easements.

Some access sites will not have the minimum required number of parking spaces associated with them as the sponsor intends to provide public transportation as an alternative to parking for these access sites. This is an acceptable option as mentioned in #6 above. In addition, the Corps will accept an alternative plan that would provide a minimum of two parking spaces for those access sites that currently have no parking available, in lieu of a transportation plan. This would only apply to the "off-peak" season (November 1 – March 31). This modification to the requirements was determined to be acceptable due to a significant decrease in demand during the off-peak season of 82%. A similar decrease of 80% of the required 10 parking spaces was deemed reasonable during this time period.

The details of the sponsor's proposed public transportation strategy are outlined in their plan. The plan as currently proposed is acceptable to the Corps. Any changes to this plan or any new issues will need to be resolved prior to signing of the Project Cooperation Agreement. The Corps understands that the sponsor is adopting the public transportation strategy as an interim solution to their parking

issues and will be actively working to replace the transportation system through the acquisition of additional parking.

The sponsor's current access and parking plan meets the Corps' parking and access criteria as previously detailed. A small section of Indian Beach fell outside of the requirements for access, but was granted an exception due to environmental considerations (See Appendix E – Exhibit 2) and therefore will be cost shared 65% Federal, 35% non-Federal.

### **Cost Sharing Percentage**

Cost sharing of the portion of the project cost above the cost of the base disposal plan can be approved at the following percentages:

- 1) Those sections of the project area, which fully comply with Section 933 requirements are referred to as public shores and are cost shared 65% Federal, 35% non-Federal sponsor for the amount above the base disposal plan.
- 2) Those sections of the project area that do not meet all Section 933 requirements, are not eligible for Federal cost sharing and are referred to as private shores. Placement of dredged material at these locations may only take place at 100% sponsor funding and must meet the requirements as described in Section I of the attached report. Currently the westernmost 1900 feet of Indian Beach (Station 700+00 to Station 681+00) does not meet the access criteria. The local sponsor acknowledges this deficiency and does not intend to pursue the option of 100% sponsor funding for this area at this time. This decision effectively reduces the current 933 Project Area from 7.2 miles to approximately 6.8 miles. If the access and parking criteria are met prior to the signing of the PCA, this area could be increased to its full potential of 7.2 miles.

The current beach access and parking plan proposed by the sponsor (see Exhibit 1) would result in the following cost sharing percentages for the Recommended Plan.

#### Federal Cost Sharing 933 Project Area (6.8 miles)

##### Federal Share:

Public Shores	6.8 miles/6.8 miles	x 65%	= 65.0%
Private Shores	0.0 miles/6.8 miles	x 0%	= 0.0%
Total Federal Share:			= 65.0%



Sponsor Share:

Public Shores	6.8 miles/6.8 miles x 35%	= 35.0%
Private Shores	0.0 miles/6.8 miles x 100%	= 0.0%
<hr/>		
Total Sponsor Share:		= 35.0%

These values are based on sponsor-provided measurements and will be subject to change if more, less, or different access sites are decided upon prior to signing of the Project Cooperation Agreement. Once all access and/or parking sites are obtained by the sponsor, and prior to signing the PCA, the Corps will gather more specific measurements using GIS and or survey data of these sites to make a final determination on project cost sharing.



## EXHIBIT 1

### **PUBLIC TRANSPORTATION AND PARKING/ACCESS PLAN SECTION 933 PROJECT**

#### **Objective**

The volume of accesses and parking facilities located along Bogue Banks meet the peak hour demand for beach visitation in accordance with the U.S. Army Corps of Engineers (USACE) Engineering Regulations 1105-2-100 and 1165-2-130. The non-federal sponsor fully intends to provide additional points of access, and to fulfill parking stipulations delineated in these regulations by employing a method of public transportation that will be used in consort with permanent parking facilities. By providing additional accesses and adequate parking accommodations, public use will be provided on equal terms for all beach visitors and therefore, the public shall be able to access all portions of the beach that encompass the Section 933 Project area. Based on the coverage described below, full federal cost share participation should be recommended for the entire proposed Section 933 Project reach.

#### **Current and Proposed Facilities**

Detailed maps of Indian Beach (IB) and Pine Knoll Shores (PKS) are enclosed as Figures 1 and 2, respectively. The Shore Protection Office and IB are in the process of securing the Ocean Club and Sea Isle Plantation-west accesses that will have associated parking located north of Highway 58 and within 0.25-mile of each respective access point. The IB and Salter Path accesses have 36 and 75 parking spaces, respectively. One issue that will require clarification is the USACE's access/parking position for the State-owned property in Salter Path. This oceanfront reach is a natural area with a central access accompanied by the 75 parking spaces referenced above. Because the oceanfront encompassed by the park is an undisturbed natural area for public use, the entire reach of the project for the State-owned property should receive full federal cost share funding. Moreover, the entire park should be considered as an "access" because the oceanfront is essentially owned by all of the public and residents of North Carolina. Therefore, the adjacent access points that are required per ER 1105-2-100 and 1165-2-130 shall be from the easternmost and westernmost boundaries of the State-owned park.

PKS has six accesses with associated parking that are denoted in Fig. 2. The access at the Sheraton borders the towns of PKS and Atlantic Beach, and parking is located within the Sheraton parking lot that is technically within the town limits of Atlantic Beach. The Shore Protection Office and PKS are also in the process of securing six additional accesses within Pine Knoll Shores that will not have associated parking, but will be served by a public transportation system. The distances between access sites (from east to west) is listed in Table 1.

**Table 1**  
**Distances Between Public Access Sites**

<b>Public Access</b>	<b>Distance Between Access Points (E to W) in miles</b>
Sheraton	0.00
Ameri-Suites	0.36
Hammer Park	0.51
PIKSCO	0.50
PKSA	0.26
Ocean Terrace	0.55
Iron Steamer	0.50
Maritime West	0.50
Ramada	0.50
Beacon's Reach (E)	0.18
Beacon's Reach (W)	0.49
Trinity Center	0.47
Sea Isle Plantation (W)	0.35
Salter Path	0.57
Indian Beach	0.58
Ocean Club	0.40

The exact locations of proposed areas of access/parking and details concerning the public transportation system may be slightly modified before the non-federal sponsor enters into the Project Cooperation Agreement. However, it is the non-federal sponsor's intention to meet the access/parking stipulations in full prior to signing the PCA

### **Pine Knoll Shores Public Transportation Plan**

The public transportation system will utilize a contracted shuttle service to ferry visitors to all of the accesses in the Pine Knoll Shores project area. The cost of the shuttle service shall be paid by the non-federal sponsor and will operate on a regular schedule delineated as follows.

Peak Season (April 1 – November 1):

Hours:	8:00am to 6:00pm, 7 days a week
Frequency:	The shuttle will provide access to each access site every 30 minutes.
Vehicle:	12+ person, handicap-accessible van/bus with capability to accommodate beach umbrellas, fishing gear, etc.
Signage:	Signs at each access site will clearly define the times that the shuttle is expected to stop at that location. They will also highlight the fact that the service is being provided free of charge, and provide specifics as to what the shuttle can accommodate in regards to number of people and types of beach supplies. A phone number for the shuttle will also be included on the sign for any extraordinary circumstances.

Off-Peak Season (November 1 – March 31):

Hours:	8:00am to 6:00pm, 7 days a week
Frequency:	Shuttle will be available on an on-call basis only. Shuttle will arrive within 15 minutes of contacting shuttle service.
Vehicle:	Handicap-accessible vehicle capable of accommodating fishing gear, surf boards, etc.
Signage:	Signs at each access site will clearly define the number to contact the shuttle, what times the shuttle is available, what the shuttle can accommodate in regards to number of people and types of beach supplies, how long they should expect to wait, and any costs that will be associated with the service.

The time period selected to represent the “peak season” is substantiated by reviewing the occupancy tax collections for the past 10 years (Fig. 3). Analyses of occupancy tax collections provide a good proxy of beach visitation trends throughout the year

### **Monitoring/Adaptation of Transportation Plan**

The non-Federal sponsor will monitor both the use of their public transportation system, as well as the amount of usage at their public parking facilities. A report of this data will be transmitted to the Corps of Engineers on an annual basis. The data will be analyzed by the Corps of Engineers to determine if any modifications to the transportation plan are warranted. Any changes proposed by the non-Federal sponsor would require written request to be approved by the Corps of Engineers.

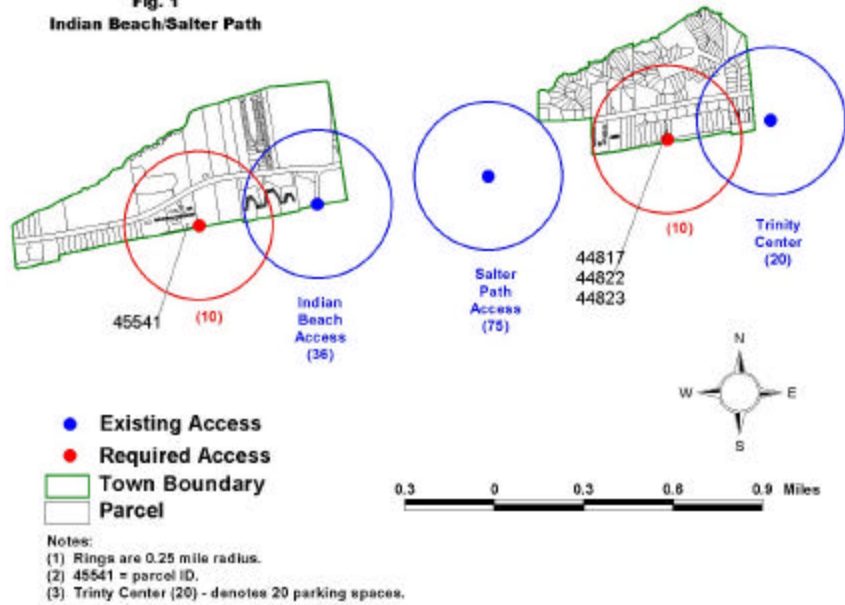
The non-Federal sponsor may decide in the future to incorporate additional parking at those access sites which currently have none. If two (2) or more parking spaces are included for each of those six access sites which currently have no parking, the Corps of Engineers has approved the off-peak portion of the transportation plan outlined above to be discontinued. The sponsor will notify the Corps of Engineers in writing of their intent to pursue this alternative prior to discontinuation of the off-peak shuttle service. If the sponsor provides the Corps’ criteria of 10 parking spaces associated with each access, the entire transportation plan may be discontinued.

### **Public Awareness Plan**

The sponsor intends to pursue several approaches to make the public aware of the public parking and access sites available as well as the details of the Pine Knoll Shores transportation plan. Those approaches include:

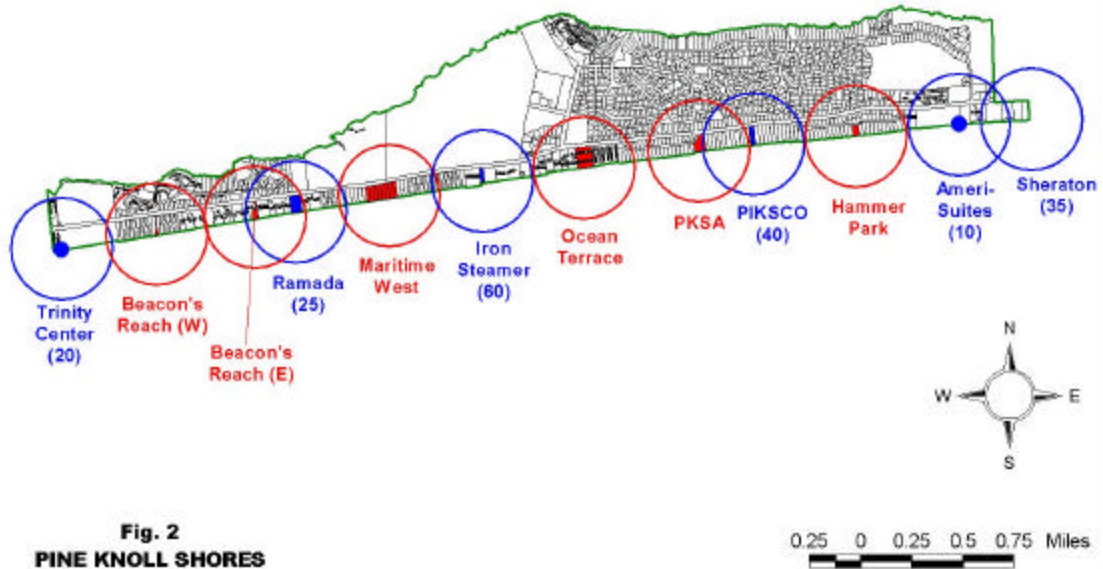
1. CAMA signs will be provided at each public access site. Signs will be posted on the main road (58) as well as at the access site itself if the site is off of the main road.
2. Large green signs at each access site where the shuttle will stop outlining those items discussed within the transportation plan.
3. Large public parking signs at each parking space or parking lot which will be included as part of the project.
4. Brochures will be developed outlining all of the parking sites, access sites, as well as outlining the specifics of the shuttle service. It may also serve as an education tool to inform the public about the project. These brochures will be placed at locations such as the Visitor Center, Town Hall, Hotels, and tourist attractions such as the PKS Aquarium.
5. The brochure material will also be placed on Pine Knoll Shores and Carteret County’s websites.
6. The shuttle used during peak season will display signage to increase visibility of the program.

**Fig. 1**  
**Indian Beach/Salter Path**

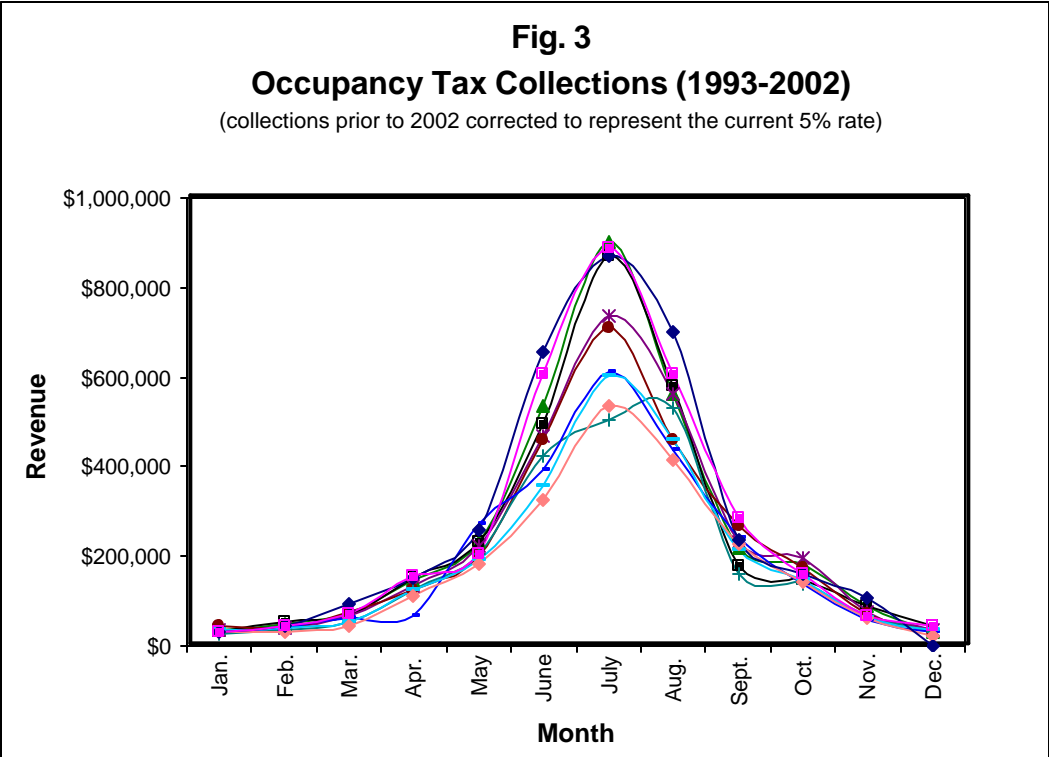


- Required Access Point
- Existing Access Point
- Town Boundary
- Parcel

Notes:  
 (1) Rings are 0.25 mile radius.  
 (2) Trinity Center (20) - denotes 20 parking spaces.



**Fig. 2**  
**PINE KNOLL SHORES**



## EXHIBIT 2

### **State Owned Property in Salter Path**

#### **Terms in Deed of Gift to North Carolina**

STATE OF NORTH CAROLINA, COUNTY OF CARTERET  
Book 439, Page 335

The deed of gift made the 3rd day of June 1980 states in part the following restrictions, which shall be binding upon the Grantee, its successors and assigns:

"2. The property shall be maintained in its natural state insofar as possible.

3. The property shall be made available primarily for the purposes of scientific study and research, and secondarily for recreational purposes, but provided that these activities shall be conducted in such a fashion as to avoid significant damage to the topography or the flora and fauna of the property."





**MOREHEAD CITY HARBOR  
CARTERET COUNTY, NORTH CAROLINA  
SECTION 933  
EVALUATION REPORT**

**APPENDIX F**



REAL ESTATE PLANAPPENDIX F  
**REAL ESTATE PLAN**

1. THE REAL ESTATE REPORT

This report is tentative in nature and is to be used for planning purposes only. Although the report is written based on specific data from Wilmington District, some minor modifications to the plan may occur thus changing the final acquisition areas and/or administrative and land cost.

The Project Sponsor (PS) is Carteret County, in cooperation with the State of North Carolina.

The author of this report has inspected the Project areas.

2. AUTHORITY

This study was conducted under the authority of Section 145 of the Water Resources Development Act of 1976, P.L. 94-587, as amended by Section 933 of the Water Resources Development Act of 1986, P.L. 99-662, and other laws, 33 U.S.C. § 426j. Projects carried out under this authority are commonly referred to as "Section 933 projects."

3. PROJECT DESCRIPTION

The removal of fill materials from Brandt Island Disposal Area at Morehead City Harbor and the newly dredged material from the harbor is beneficial for use in nourishment of beach communities that have experienced severe storm damage and have erosion problems. In prior years, material removed from Brandt Island Disposal Area was placed along Fort Macon and Atlantic Beaches, a distance of approximately 32,000 feet, under authority of a previously approved project. This area is identified on exhibit A as the Least Cost Disposal Area.

The communities of Pine Knoll Shores, Indian Beach and Salter Path have suffered the effects of six named storms since 1996. These areas are being evaluated for eligibility under Section 933 and are shown on the attached exhibit A as the 933 Project area. The areas proposed for nourishment with cost sharing authority of Section 933 include approximately 25,000 feet along Pine Knoll Shores and 13,000 feet of Indian Beach (including Salter Path). Disposal of the material along this 38,000 feet reach would result in a beach fill with a minimum placement of 75 cubic yards per linear foot. Placement of fill will be to elevation 7 feet above mean sea level. This will be a one-time placement of sand with no periodic nourishment. The project will result in the reduction of erosion and substantially reduce the storm damage potential.

#### 4. REAL ESTATE ACQUISITION

The requirements for lands, easements, rights-of-way and relocations, and disposal/borrow areas (LERRD's) will include the rights to place dredged material in a berm design to aid in the control of erosion over wash during storms. The placement of sand will be within the limits identified on exhibit "A" as the "933 Project Area." The project sponsor will be required to provide a Perpetual Beach Storm Damage Reduction Easement across properties that are located within the project area except for those lands that are below MHW. A copy of the Perpetual Beach Storm Damage Reduction Easement is attached as exhibit "B". A permit from the State of North Carolina is not required for placement of sand seaward of mean high water (MHW). However, the sponsor must provide a letter to the State notifying of the intent to place sand on land seaward of MHW. The material will be pumped through an existing perpetual pipeline easement acquired in 1993 for the Morehead City Harbor Improvement Project, Brandt Island to Atlantic Beach. Under the current project plans, no need for additional pipeline easements, temporary work area easements for staging or construction has been identified.

There are 259 tracts that are privately owned along the project area. Existing easements are in place that were acquired from the fee owners at no cost by the sponsor for a local, non-federally funded project. The easements incorporate the standard language in the Perpetual Beach Storm Damage Reduction Easement. A Gross Appraisal was not performed for this study, but historically appraisals for beach projects have estimated the easements to have zero value due to offsetting benefits.

After review of the existing easements, CESAS-RE has determined that if all sand is placed within the limits of the existing easement, no additional easements should be necessary. However, after completion of project design and surveys, should it be determined that sand will be placed outside the existing easement area, the PS will be responsible for providing any additional real estate interest required.

Access to the beach will be by public access points that are located along the beach area. Should the local sponsor be required to obtain additional public access areas, these areas should be acquired as easements for the term of years identified in the Project Cooperation Agreement (PCA) for which the local sponsor is responsible for providing public access for the project. Acquisition of public beach access is not considered a creditable expense towards project cost.

#### 5. UTILITY RELOCATION

There will be no utility relocations.

#### 6. EXISTING PROJECTS

The Morehead City Harbor Improvement Project, Brandt Island to Atlantic Beach, approved in 1986, is located east of the proposed project.

## 7. ENVIRONMENTAL IMPACTS

No adverse environmental impacts are expected.

## 8. PROJECT SPONSOR RESPONSIBILITIES AND CAPABILITIES

Carteret County will be the Project Sponsors (PS). The PS has the responsibility to acquire all real estate interests required for the Project, should any additional real estate interest be identified. The PS shall accomplish all alterations and relocations of facilities, structures and improvements determined by the government to be necessary for construction of the Project.

Title will not be vested in the United States Government. The government will require access rights be provided by the PS for entry to the Project. Prior to advertisement of any construction contract, the PS shall furnish to the government an Authorization for Entry for Construction (Exhibit "C") to all lands, easements and rights-of-way, as necessary. The PS will also furnish to the government evidence supporting their legal authority to grant rights-of-way to such lands.

The PS shall comply with applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, approved 2 January 1971, and amended by Title IV of the Surface Transportation Uniform Relocation Assistance Act of 1987, Public Law 100-17, effective 2 April 1989, in acquiring real estate interests for the Project, and inform all affected persons of applicable benefits, policies, and procedures in connection with said Act(s). An assessment of the Non Federal Sponsors Real Estate Capability has been prepared with the cooperation of the Project Sponsor and is attached as exhibit D.

## 9. GOVERNMENT OWNED PROPERTY

There are no Government owned lands within the proposed project limits.

## 10. MINERAL RIGHTS

There are no known mineral activities within the scope of the proposed Project.

## 11. PUBLIC LAW 91-646, RELOCATION ASSISTANCE BENEFITS

Public Law 91-646, Uniform Relocation Assistance provides entitlement for various payments associated with federal participation in acquisition of real property. Title II makes provision for relocation expenses for displaced persons, and Title III provides for reimbursement of certain expenses incidental to transfer of property. There will be no relocation of persons or Title III costs associated with the project.

## 12. REAL ESTATE ESTIMATE

The estimated real estate costs include land and improvement values, damages, mineral rights, resettlement cost, and federal as well as non-federal administrative costs.

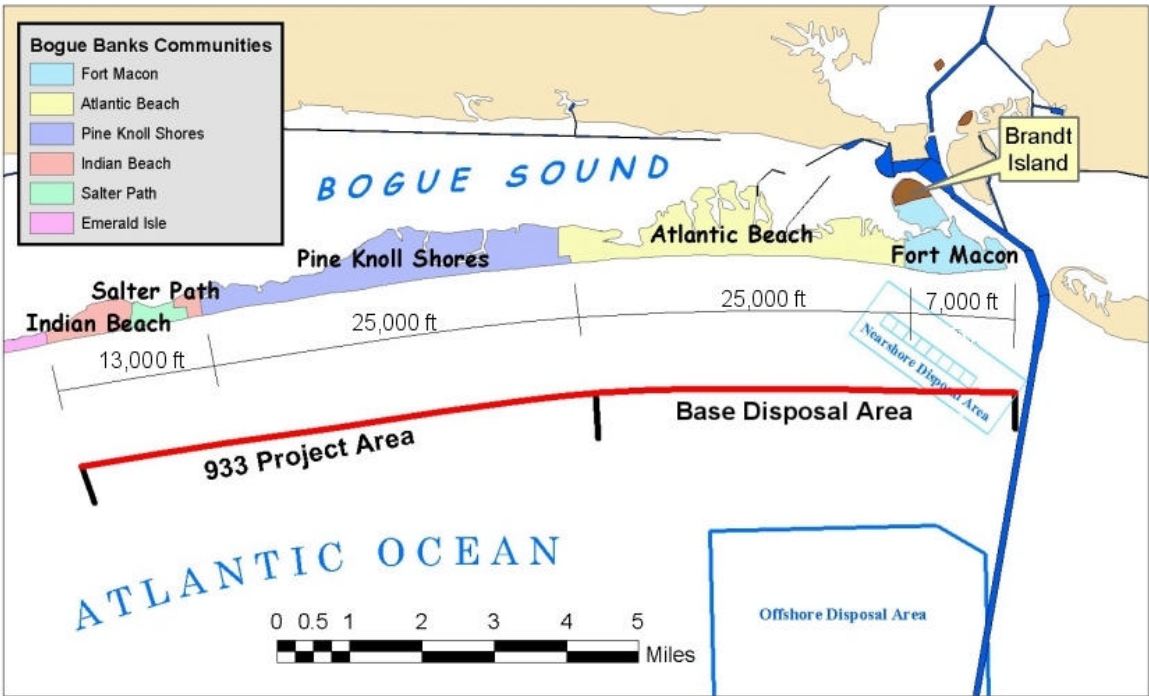
A 25% contingency is applied to the estimated total of these items. A Code of Accounts is at Exhibit "E".

**Estimate (Includes Residential & Commercial Properties)**

a. Lands	\$ -0-
b. Improvements	-0-
c. Mineral Rights	-0-
d. Damages	-0-
e. P. L. 91-646 Relocation Costs (Recordation Fees)	-0-
f. Acquisition Cost - Admin	\$7,500
Prepare Mapping and RE Certification	
Federal (\$ 2,500)	
Non-federal (\$ 5,000)	
Sub-Total	\$7,500
Contingencies (25%)	\$1,875
<b>TOTAL</b>	<b>\$9,375</b>
<b>ROUNDED TO</b>	<b>\$9,500*</b>

**\* This estimate assumes the fact that the PS will not have to acquire additional easements. Should additional easements be required, the cost will increase accordingly.**

Exhibit A



## **Exhibit B**

### **PERPETUAL BEACH STORM DAMAGE REDUCTION EASEMENT**

A perpetual and assignable easement and right-of-way in, on, over and across (the land described in Schedule A) (Tract No. \_\_) for use by the (Project Sponsor), its representatives, agents, contractors, and assigns, to construct; preserve; patrol; operate; maintain; repair; rehabilitate; and replace; a public beach [a dune system] and other erosion control and storm damage reduction measures together with appurtenances thereto, including the right to deposit sand; to accomplish any alterations of contours on said land; to construct berms [and dunes]; to nourish and renourish periodically; to move, store and remove equipment and supplies; to erect and remove temporary structures; and to perform any other work necessary and incident to the construction, periodic renourishment and maintenance of the (Project Name), together with the right of public use and access; [to plant vegetation on said dunes and berms; to erect, maintain and remove silt screens and sand fences; to facilitate preservation of dunes and vegetation through the limitation of access to dune areas;] to trim, cut, fell, and remove from said land all trees, underbrush, debris, obstructions, and any other vegetation, structures and obstacles within the limits of the easement (except\_\_\_\_\_); [reserving, however, to the grantor(s), (his) (her) (its) (their) (heirs), successors and assigns, the right to construct dune overwalk structures in accordance with any applicable Federal, State or local laws or regulations, provided that such structures shall not violate the integrity of the dune in shape, dimension or function, and that prior approval of the plans and specifications for such structures is obtained from the (designated representative of the Project Sponsor) and provided further that such structures are subordinate to the construction, operation, maintenance, repair, rehabilitation and replacement of the project; and further] reserving to the grantor(s), (his) (her) (its) (their) (heirs), successors and assigns all such rights and privileges as may be used and enjoyed without interfering with or abridging the rights and easements hereby acquired; subject however to existing easements for public roads and highways, public utilities, railroads and pipelines.



## Exhibit C

### AUTHORIZATION FOR ENTRY FOR CONSTRUCTION

I, (name of accountable official), (title) for (name of non-Federal sponsor), do hereby certify that the (name of non-Federal sponsor) has acquired the real property interests required by the Department of the Army, and otherwise is vested with sufficient title and interest in lands to support construction of (project name, specifically identified project features, etc.). Further, I hereby authorize the Department of the Army, its agents, employees and contractors, to enter upon (identify tracts) to construct (project name, specifically identified project features, etc.) as set forth in the plans and specifications held in the U. S. Army Corps of Engineers' \_\_\_\_\_ District Office, (city and state)

WITNESS my signature as (title) for (name of non-Federal sponsor) this \_\_\_\_\_ day of \_\_\_\_\_, 19\_\_\_\_.

BY: \_\_\_\_\_  
\_\_\_\_\_  
(title)

### ATTORNEY'S CERTIFICATE OF AUTHORITY

I, (name), (title of legal officer) for (name non-Federal sponsor), certify that (name of non-Federal sponsor) has authority to grant Authorization for Entry; that said Authorization for Entry is executed by the proper duly authorized officer; and that the Authorization for Entry is in sufficient form to grant the authorization therein stated.

WITNESS my signature as (title) for (name of non-Federal sponsor), this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_.

BY: \_\_\_\_\_  
\_\_\_\_\_  
(title)

## Exhibit D

### Assessment of Non-Federal Sponsor's Real Estate Acquisition Capability

#### I. Legal Authority:

- a. Does the sponsor have legal authority to acquire and hold title to real property for project purposes? (**yes/no**)
- b. Does the sponsor have the power of eminent domain for this project? (**yes/no**)
- c. Does the sponsor have “quick-take” authority for this project? (**yes/no**)
- d. Are any of the land/interests in the land required for this project located outside the sponsor’s political boundary? (yes/**no**)
- e. Are any of the lands/interests in land required for the project owned by an entity whose property the sponsor cannot condemn? (yes/**no**)

#### II. Human Resource Requirements:

- a. Will the sponsor’s in-house staff require training to become familiar with the real estate requirements of Federal projects including P. L. 91-646, as amended? (yes/**no**)
- b. If the answer to II.a. is “yes”, has a reasonable plan been developed to provide such training? (yes/no)
- b. Does the sponsor’s in-house staff have sufficient real estate acquisition experience to meet its responsibilities for the project? (**yes/no**)
- c. Is the sponsor’s projected in-house staffing level sufficient considering its other work load, if any, and the project schedule? (**yes/no**)
- e. Can the sponsor obtain contractor support, if required in a timely fashion? (**yes/no**)
- f. Will the sponsor likely request USACE assistance in acquiring real estate? (yes/**no**)

III. Other Project Variables:

- a. Will the sponsor's staff be located within reasonable proximity to the project site?  
(yes/no)
- b. Has the sponsor approved the project/real estate schedule/milestones? (yes/no)

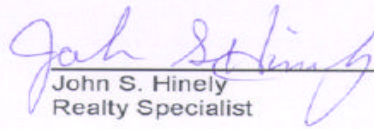
IV. Overall Assessment:

- a. Has the sponsor performed satisfactory on other USACE projects?  
(yes/no/not applicable)
- b. With regard to the project, the sponsor is anticipated to be: **highly capable**/fully capable/moderately capable/marginally capable/insufficiently capable.

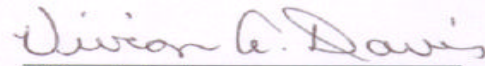
V. Coordination:

- a. Has this assessment been coordinated with the sponsor? (yes/no)
- b. Does the sponsor concur with this assessment? (yes/no) (If "no", provide explanation)

Prepared by:

  
John S. Hinely  
Realty Specialist

Reviewed and approved by:

  
Vivian A. Davis  
Acting Chief, Real Estate Division

## Exhibit E

Morehead City Harbor Section 933  
Carteret County, NC

### CODE OF ACCOUNTS

01A	PROJECT PLANNING	FEDERAL	NON-FEDERAL	TOTALS
	Other			
	Project Cooperation Agreement	\$	\$	\$
01AX	Contingencies (25%)	<u>\$</u>	<u>\$</u>	<u>\$</u>
	Subtotal	\$	\$	\$
01B	LANDS AND DAMAGES			
01B40	Acq/Review of PS	\$ 2,500.00	\$	\$ 2,500.00
01B20	Acquisition by PS	\$	\$ 5,000.00	\$ 5,000.00
01BX	Contingencies (25%)	<u>\$ 625.00</u>	<u>\$ 1,250.00</u>	<u>\$ 1,875.00</u>
	Subtotal	\$ 3,125.00	\$ 6,250.00	\$ 9,375.00
01H	AUDIT			
01H10	Real Estate Audit	\$	\$	\$
01HX	Contingencies (25%)	<u>\$</u>	<u>\$</u>	<u>\$</u>
	Subtotal	\$	\$	\$
01R	REAL ESTATE LAND PAYMENTS			
01R1B	Land Payments by PS	\$	\$ 0.00	\$ 0.00
01R2B	PL91-646,Recordation Fee- PS	\$	\$ 0.00	\$ 0.00
01R2D	Review of PS	\$	\$	\$
01RX	Contingencies (25%)	<u>\$</u>	<u>\$ 0.00</u>	<u>\$ 0.00</u>
	Subtotal	\$	\$ 0.00	\$ 0.00
	TOTALS	<u>\$ 3,125.00</u>	<u>\$ 6,250.00</u>	<u>\$ 9,375.00</u>
	<b>ROUNDED TO</b>			<b><u>\$ 9,500.00</u></b>



**MOREHEAD CITY HARBOR  
CARTERET COUNTY, NORTH CAROLINA  
SECTION 933  
EVALUATION REPORT**

**APPENDIX G  
GEOTECHNICAL ANALYSIS**





## **APPENDIX G**

### **Geotechnical Analysis**

#### **BACKGROUND**

Morehead City Harbor dredge material has traditionally been placed in Brandt Island or on the beach at Atlantic Beach and Fort Macon. The material in Brandt Island was sampled and grain size tests were performed in the mid-1980's prior to the initial pump out in 1986. The quality of the material was determined to be suitable for beach disposal. Brandt Island was pumped out again in 1994 with the material being disposed of on the beach.

Material for the Morehead City Inner Harbor is placed in the Brandt Island Disposal Area. The Inner Harbor material was tested and analyzed previously. The overfill ratio of this material ranges between 69 and 86 percent. These results show that the material is adequate for beach placement. The material to be placed on the beach as part of this project is expected to be similar to the material placed previously, as the material in Brandt Island was dredged from the same reaches of the Harbor as material previously pumped out of Brandt Island.

The Morehead City Harbor was dredged in spring of 2002. Material from the Harbor was placed on the beach at Fort Macon and in the Brandt Island Disposal Area. The subsurface investigation and analysis will be performed on the shoals that have formed since the 2002 dredging and that are to be removed from the Harbor under this project. It will be assumed that the material in Brandt Island is the same as the Inner Harbor material tested for this project, since the Inner Harbor material from previous dredging is stored in Brandt Island.

#### **SUBSURFACE INVESTIGATION**

The subsurface investigation will include drilling the shoals in Morehead City Harbor and the material in the Brandt Island Disposal Area, taking beach grab samples, and grain size testing the material collected from these samples.

Morehead City Harbor Drilling. The borings will be performed with the snagboat SNELL using a 3 7/8 inch diameter Alpine vibracore drill machine. It is planned to drill twenty, 10-foot borings in the Harbor area and the connecting channels with the worst shoals. It is expected to take two days to perform the borings, with one additional day is included for weather. Each tube is expected to have approximately 3 soil samples, for a total of 60 samples.

Brandt Island Land Drilling. No borings will be performed on Brandt Island as part of this project. It is assumed that the material in Brandt Island is the same

as the Inner Harbor material tested for this project, since the Inner Harbor material from previous dredging is stored in Brand Island.

Beach and Near Shore Grab Samples. Grab samples will be collected from twenty-five profile lines perpendicular to Fort Macon, Atlantic Beach, Pine Knoll Shores, Indian Beach, Emerald Isle, and Bogue Inlet Area. In the foreshore area or beach area, it is estimated six surface samples will be collected from each of the twenty-five profile lines for a total of 150 samples. For each profile, one grab sample will be collected from each of the following six locations: 1) the seaward toe of the dune; 2) the seaward crest of the berm approximately at elevation +7 NGDV; 3) mean high water, approximately at elevation +2.2 NGVD; 4) mean sea level, approximately +0.35 ft NGVD; 5) mean low water, approximately elevation -1.5 NGVD; and 6) at -3 NGDV. In the ocean, it is estimated that an average of 15 surface samples will be collected from each of the twenty-five profile lines for a total of 375 samples. For each profile, one grab sample shall be taken at 2-foot increments of elevation beginning at elevation -4 NGVD through elevation -24 NGVD. The extra samples account for undulations of the ocean bottom. The samples shall be collected from the top one to four inches of ocean bottom.

Lab Testing. Approximately 60 Harbor soils samples and 525 beach and near shore samples are expected to be tested. These samples will be tested for grain size, silt content, and shell content in accordance with ASTM D 422 using a minimum of 12 sieves. Samples will be classified in accordance with the Unified Soils Classification system.

## **ANALYSIS AND REPORT PREPARATION**

All the samples collected from the Harbor Shoal material and the beach grab samples will be analyzed to determine the material suitability for beach placement. Based on material removed from the Harbor and Brandt Island in the past, it is expected that the material designated for beach placement as part of this project will be suitable.

**MOREHEAD CITY HARBOR  
CARTERET COUNTY, NORTH CAROLINA  
SECTION 933  
EVALUATION REPORT**

**APPENDIX H  
PROJECT COSTS**



## **APPENDIX H PROJECT COSTS**

### **Project Costs**

The general approach was to prepare an independent estimate for all items of work necessary to complete the project. The pricing level used was October 2002 because of the extensive data collected and evaluated through this period of time.

The majority of construction cost items were developed using the Corps of Engineers Dredge Estimating Program (CEDEP) along with historical production. The previous Brandt Island pump out by pipeline dredge, October 1993 till January 1994 (with Jan 94 thru Mar 94 for inner harbor deepening), with sand placement on Ft. Macon and Atlantic Beach was evaluated. Additional production and costs by pipeline dredge for recent beach placement projects were evaluated. Historical production and costs for hopper dredging with offshore disposal and sand placement on the beaches was used in the evaluation and preparing the cost estimate.

The dredging plant selected as the basis for the cost estimates is typical for similar projects along the east coast and historical plant for past projects. Pipeline dredging was based on 27 to 30 inch hydraulic cutterhead. Hopper dredging was based on medium class hopper of 2,500 to 3,000 cubic yard capacity for offshore disposal as well as pump out of the hopper to the beach from the near shore.

A reasonable approach for placing sand on the beach was pumping sand from Brandt Island and Inner Harbor to Fort Macon, Atlantic Beach and much of Pine Knoll Shores up to 8 or 9 miles. Hopper dredging of sand in the entrance channels would be placed on the beach by pump out from near shore at western Pine Knoll Shores through Indian Beach. The project should not require dredging of sand from the entrance channels with a hopper; however, it appears to be the most reasonable approach.

Placement of sand on the beach by pipeline dredge would begin after November 15 and continue until completion. Placement of sand on the beach after May 15 would require turtle monitoring until completion. Hopper dredging can only be done in the entrance channel from January 1 through March 31.

The costs for Planning, Engineering and Design as well as Construction Management were furnished by Project Management and coordinated with those responsible for performing activities within these disciplines.

A contingency of 10% was applied to cover potential variations in project requirements that may not be known or defined at the date of this report.

The cost estimate is shown on Table H-1 on the following page.

Prepared by:

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John C. Caldwell  
Civil Engineer

Reviewed by:

---

Charles D. Carmen  
Chief, General Engineering Section

**TABLE H-1  
FIRST COST SUMMARY**

Description	Sand Placement Location	Costs
<b>TOTAL SECTION 933 PROJECT + MODIFIED DISPOSAL PLAN:</b>		
Mobilization & Demobilization		\$2,850,000
Pumpout Brandt Island & Inner Harbor	Fort Macon & Atlantic Beach	\$3,706,654
Pumpout Brandt Island, Inner Harbor, & Entrance Channel	AB, PKS, & IB	\$24,654,870
Embankment Replacement		\$500,000
Beach Tilling		\$137,600
Planning Engineering & Design		\$375,000
Construction Management		\$100,000
SUBTOTAL before Contingencies		<b>\$32,324,124</b>
Contingencies (10%)		\$3,211,876
<b>TOTAL Section 933 Project + Modified Disposal Plan</b>		<b>\$35,536,000</b>
<b>BASE DISPOSAL PLAN:</b>		
Mobilization & Demobilization		\$1,750,000
Pumpout Brandt Island & Inner Harbor	Atlantic Beach and Fort Macon	\$10,737,600
Mobilization & Demobilization		\$250,000
Dredge Entrance Channel	Near Shore Disposal Area	\$3,900,000
Embankment Replacement		\$500,000
Beach Tilling		\$130,400
Planning Engineering & Design		\$120,000
Construction Management		\$50,000
SUBTOTAL before Contingencies		<b>\$17,438,000</b>
Contingencies (10%)		\$1,744,000
<b>TOTAL Base Disposal Plan</b>		<b>\$19,182,000</b>
<b>SECTION 933 PROJECT COSTS</b>		<b>\$16,354,000</b>